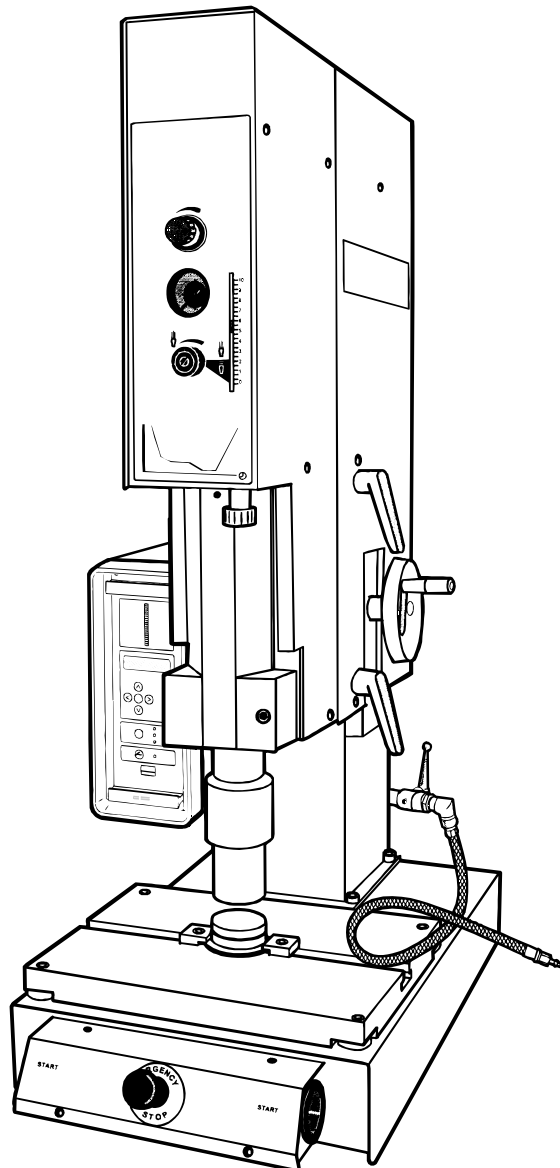


Ultrasonic Welder for Plastics

Multipress MP202

with

Generator SL20

..... TECHSPAN GROUP
P O Box 1012, Mascot, NSW 1460
P O Box 15 262, New Lynn, Auckland
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....AA 1800 148 791...NZ ++64 9 827 6567



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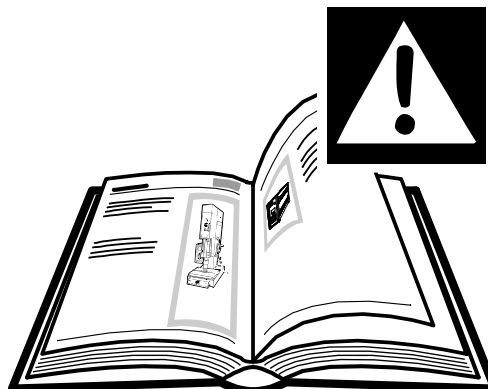


Note



Read this operating manual and study it carefully before unpacking and putting the machine into operation.

The machine may only be used, maintained and repaired by persons who are familiar with the operating manual and the applicable regulations concerning working safety and accident prevention.



Machine specification

Sticker

Multipress

Sticker

Generator

Representative

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Preface

Congratulations on having purchased the Multipress. This manual is designed to provide buyers and users with all the information they will need to handle, install, operate and maintain the Multipress. To ensure that the system is always ready for operation, it is necessary to follow the notes and instructions in this manual.

The manual is broken down into the following chapters:

Chapter	Safety information Contains notes and warnings concerning the operation of the welding system.	Chapter	Operation Explains the sequence and operation of a welding cycle.
Chapter	Product information Contains all the general information concerning: - function, design and mode of operation - technical data - warranty	Chapter	Elements Describes the various exchangeable elements.
Chapter	Transportation Contains necessary information on the transportation and receipt of the press.	Chapter	Application examples Describes the different possibilities of welding applications.
Chapter	Operating and display elements Describes the operating elements.	Chapter	Retooling Describes how to change a horn or booster.
Chapter	Initial start-up Provides important notes and instructions concerning the installation, connection and start-up of the device.	Chapter	Cleaning and maintenance Contains instructions and notes concerning the care and upkeep of the press.
	Includes all the information and procedures necessary for the safe and efficient handling of the Multipress.	Chapter	Error messages and corrective action Describes possible errors, their likely sources and suggestions for corrective action.
		Other chapters	Diagrams and drawings

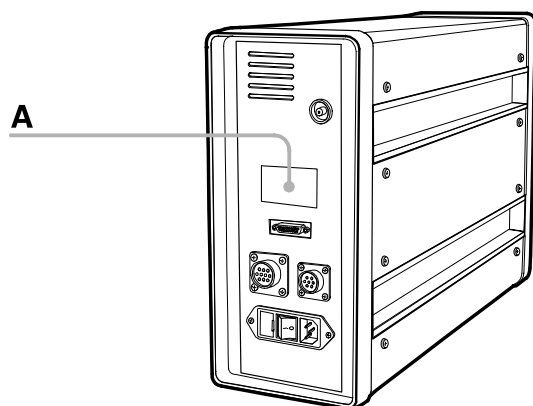
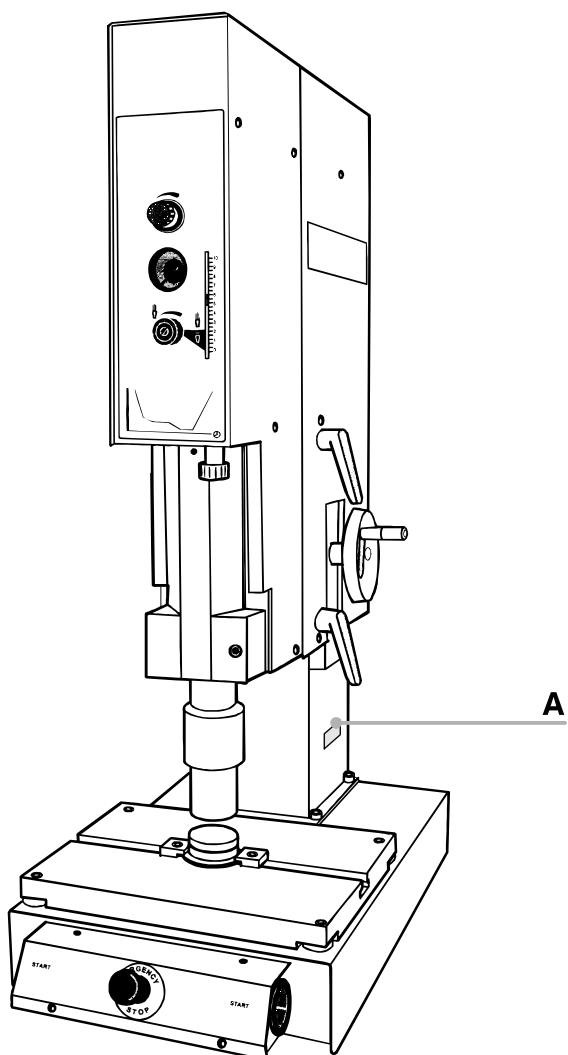
Important

Please quote the exact type designation and the unit serial numbers in all enquiries concerning your Multipress and your Generator.

You will find this data on the rating plate (A) at the back of each unit, as well as on the inside cover flap of this operating manual.

The design and circuitry of these units are subject to continuous further development and improvement, and represent the latest state of the art.

RINCO ULTRASONICS AG
Romanshorn, Switzerland





Ruled lines for notes.

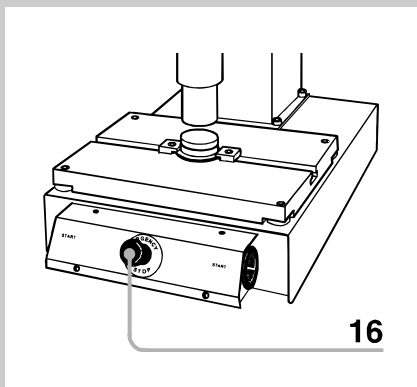
1 Explanation of symbols and signs

Special attention should be paid to passages with the following symbols:

Special information or operating instructions.



Warnings regarding risk of personal injury or damage to parts of the equipment.



The item numbers used in the illustrations and descriptions, e.g.:

EMERGENCY STOP button (16)

correspond to the item numbering adopted in the product overview included in the chapter "Product information", or to adjacent drawings, generally on the same page.





2 Safety information

2.1 General

The design of the Multipress and generator conforms to the current state of engineering and is safe to operate.

The individual modules and the complete unit are subject to continual inspection by our quality assurance department.

2.2 Intended purpose

The Multipress is intended exclusively for the ultrasonic welding of suitable plastics. Any other use is regarded as inconsistent with the intended purpose, and is undertaken at the user's own risk. The manufacturer is not liable for any resultant damage.



Intended for industrial use.

2.3 Special points to note

Before you start up the machine for the first time, read this operation manual carefully.

Being badly informed about how to operate and look after the press and generator can result in damage.

Always keep the operating manual handy at the site of the Multipress.

Do not perform any modifications, extensions or conversions on the Multipress which might endanger safety without the supplier's consent.

Do not alter the programming (software) of programmable control systems.

2.4 Choosing staff

Work on the Multipress may only be performed by reliable staff. Only use trained or instructed staff, and make sure that staff responsibilities for operation, set-up, maintenance and repairs are clearly defined.

Make sure that the Multipress is only used by authorized staff.

Work on the electrical installations of the Multipress may only be performed by an electrical specialist or instructed staff under the management and supervision of an electrical specialist, according to electrical engineering standards.

Only trained staff with knowledge and experience of pneumatic systems may work on the pneumatic equipment.

2.5 Installing the units



Always unplug the power cable before making any connections to peripheral units.

Be sure to fit the power supply with a grounding connector!



Observe any statutory safety regulations in force in your country!

Failure to observe these regulations will exempt the manufacturer from all liability for injury to persons or damage to materials!

Before starting up the unit, always make sure it is in a closed and safe condition.

Only use dry compressed air for operation. If necessary, install an upstream water trap.

2.6 Operation



Never open the generator or converter housing while the Multipress is in operation.

There is a high voltage inside the units - risk of injury!

Avoid any potentially unsafe working practices.



Only operate the Multipress when all protective equipment and safety-related apparatus, e.g. detachable protectors, EMERGENCY STOP buttons, soundproofing, etc. are in place and in working order.

Failure by customers to order and use safety precautions such as the sound booth shall exempt the manufacturer from all liability for damage which could have been avoided by using the safety devices provided.

Before switching on the Multipress, make sure that no-one is endangered by the starting up of the machine.



In normal operation, the two-hand trigger button must be operated by the same person using both hands.

Bypassing this button by means of a third party or any other conceivable practice shall exempt the manufacturer from all liability for injury to persons or damage to materials!

Correct operation and careful handling of the units and their associated tools during operation will

- keep the system ready for service,
- prolong its useful life, and
- reduce stoppage times to a minimum.

2.6.1 Noise emissions



Limit values: according to current information, ultrasonics are harmless provided the maximum level is below 140 dB and the mean level, on an 8h/day basis, is below linear 110 dB.

Attention must be paid to the subharmonic, i.e. audible vibrations, which fluctuate widely according to the application and can have a very harmful and damaging effect. The limiting range is the energy-equivalent continuous sound level L_{eq} in relation to a representative working period (min. 8 h/day, max. 2000 h/year) of 85-87 dB(A).



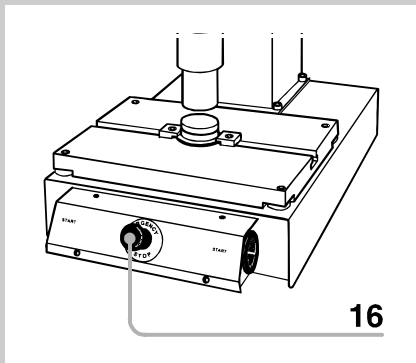
From this limit value upwards, the staff at the workstation must be issued with ear protection, or a machine-specific sound-proofing device is necessary.

(Data according to SUVA-Information No 86048 d 4.94)

2.7 EMERGENCY STOP button

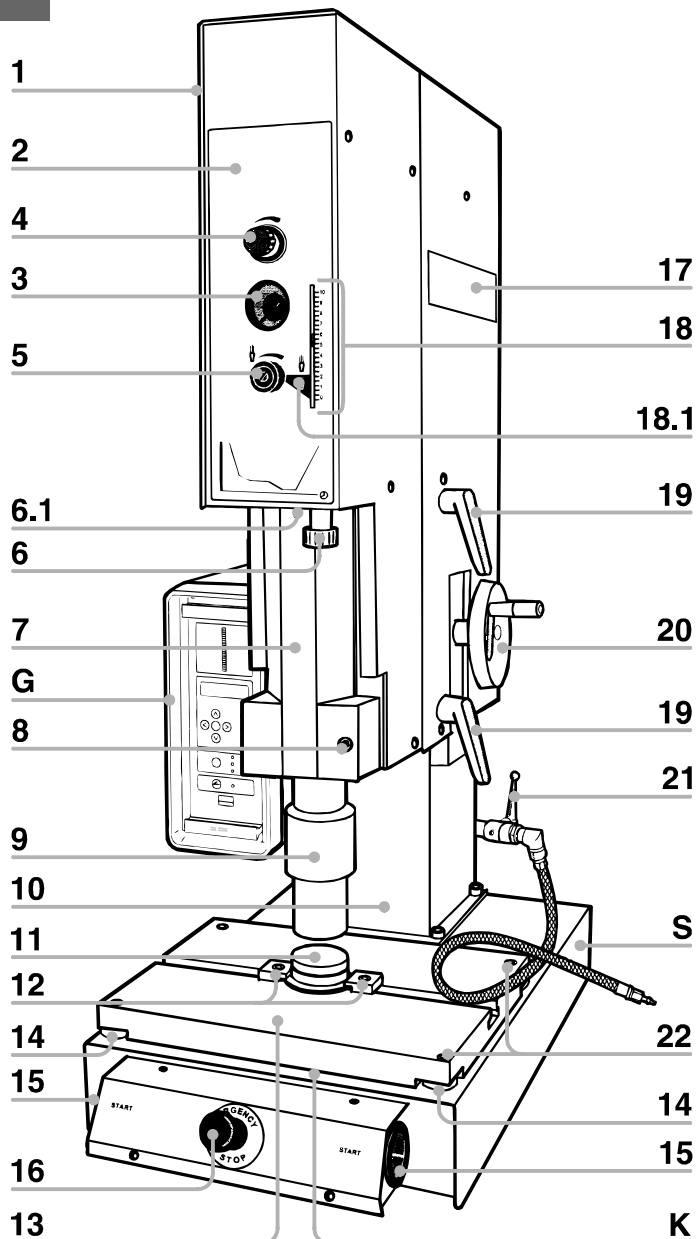
If there is an imminent risk of injury to the user or damage to the press:

- Push the EMERGENCY STOP button (16).
- The press stops instantly and is disconnected from the mains voltage.





1



3 Product information

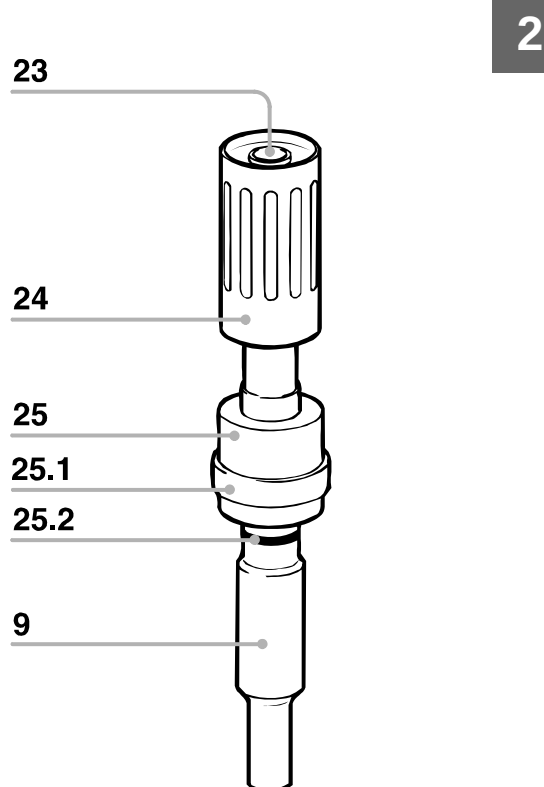
3.1 Product overview

3.1.1 Multipress

- 1 Metal panelling
- 2 Front panel
- 3 Pressure gauge
- 4 System pressure controller
- 5 Speed throttle
- 6 Vernier for depth stop
- 6.1 Clamping screw
- 7 Converter housing
- 8 Fastening screw for converter housing
- 9 Horn
- 10 Rectangular column
- 11 Fixture
- 12 Clamps
- 13 Clamping table
- 14 Adjusting nuts for parallel alignment
- 15 Dual safety switch
- 16 EMERGENCY STOP button
- 17 Name plate
- 18 Scale for feed
- 18.1 Trigger marking
- 19 Clamping levers for fixing the press head
- 20 Handwheel for rough fixing of the press head
- 21 Compressed-air hose tap and air hose with connecting branch
- 22 Clamping screws for clamping plate
- G Generator
- S Base
- K Brief operating instructions

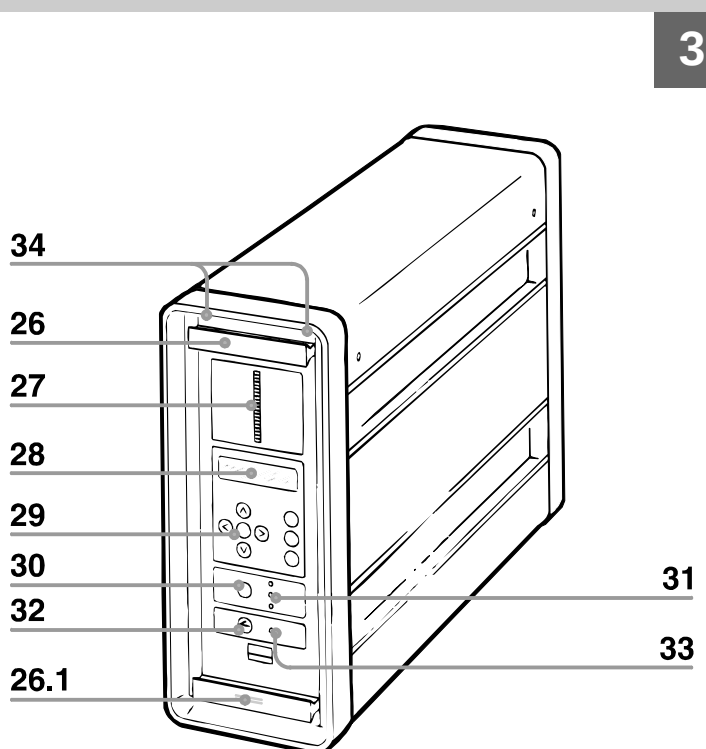
3.1.2 Vibration system

- 9 *Horn*
- 23 *RF socket*
- 24 *Converter*
- 25 *Booster*
- 25.1 *Type designation*
- 25.2 *Booster designation*

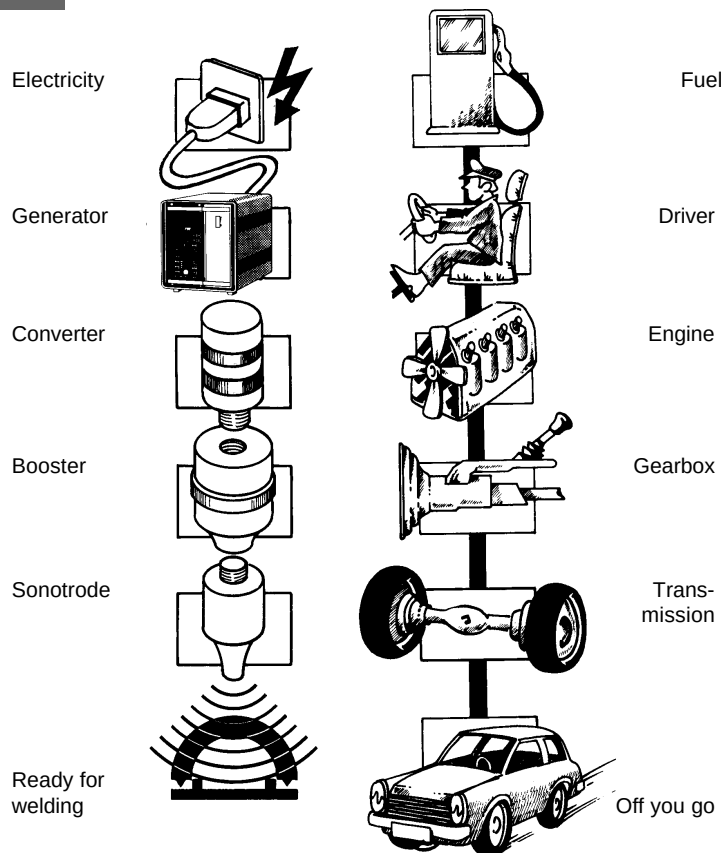


3.1.3 Ultrasonic generator

- 26 *Generator module grips*
- 26.1 *Type designation*
- 27 *LED bar*
- 28 *2-line LCD display*
- 29 *Input keypad*
- 30 *Function key US TEST*
- 31 *Status displays*
US ON (green)
VALVE (green)
ERROR (red)
- 32 *Key "ON/OFF"*
- 33 *LED "POWER"*
- 34 *Fastening screws*



4



3.2 Comparative example

3.3 Use of ultrasonics in the plastics industry

As you know, thermoplastics are available today in a large number of types and forms can be found in the most diverse products. The use of ultrasonic welding is therefore equally diversified. It covers all imaginable technical fields where plastic materials are processed in one way or another or where they find application as components.

3.4 Fundamentals and advantages of ultrasonic welding

Ultrasonic welding is an assembly process for the mass production of quality articles. Its great advantage is its economic efficiency.

Ultrasonics works without pollution and without foreign agents. Ultrasonic welding can therefore be recommended for use in sterile rooms, because there can be no pollution of surroundings by any additives.

A typical ultrasonics work cycle takes just a fraction of a second, with the melted weld solidifying again immediately after the welding operation.

This means that the workpiece is able to withstand loads and to be transported and further processed straight after the operation. No additional work is required.

An ultrasonic weld is produced with the material's inherent structure, i.e. without the addition of foreign agents such as adhesives, solvents, etc. This characteristic makes for an assembly process with a high level of automation convenience and productivity.

The energy requirement per welding operation is minimal. The efficiency of this modern ultrasonic welding system is approximately 95%.

3.5 Mode of operation and characteristics of the Ultrasonic Multipress

The system created with the Multipress and the generator combines mechanical precision and strength with immense versatility.

At the same time we have been concerned to keep the unit as simple as possible in its operation and application.

The press can be adjusted in height by means of a handwheel (height adjustment mechanism) and can be moved precisely in a "dovetail" guide. The clamping table is aligned parallel to the horn face by means of an adjusting mechanism.

3.6 Warranty statement

With the delivery of this system RINCO Ultrasonics AG acknowledges its warranty obligation in accordance with VSM (Association of Swiss Machine Builders).

Fulfilment of the terms of this warranty by RINCO Ultrasonics AG shall be conditional, however, on a number of requirements, for example:



The user must be familiar with the contents of this Operating Manual.

The instructions and warnings contained in this Operating Manual must be observed.

Unauthorized conversions or modifications to parts of the press and generator are prohibited.

RINCO Ultrasonics AG shall be glad to clarify any unclear points on the phone or to provide instruction by capable specialists.

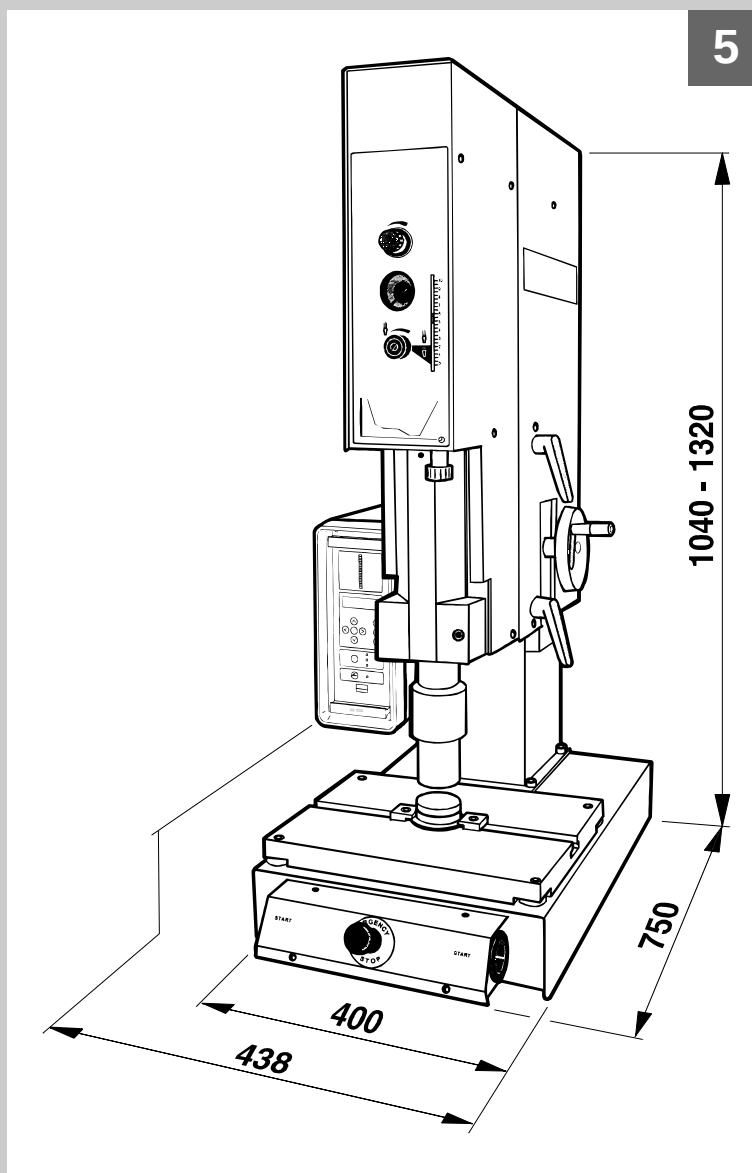


3.7 Technical data of the Multipress

Dimensions in mm

Weight:

incl. SL-Generator 99 kg



3.7.1 Actuator

- Tool travel max.: 100 mm
- Force at 6 bar: 3'000 N
- Adjustable depth control stop with vernier.
- Precision cross-roller guide on the feed slide.
- Depth stop with vernier and scale.
- Double-acting cylinder, damping possible in every position.
- Switch for cylinder home position.
- Dynamic sensor to trigger ultrasonics (adjustable according to force).
- Piezoelectric converter.
- Threaded coupling for horn: M12

3.7.2 Booster

Reducing Booster	Color	Material	Booster	Color	Material
1 : 0.5 1 : 0.6	blue violet	Aluminium Aluminium	1 : 1 1 : 1.5	green yellow	Aluminium Aluminium
other ratios on request			1 : 2 1 : 2.5 1 : 3	white black brown	Titanium Titanium Titanium

3.7.3 Base

- Ribbed steel construction.
- Tool clamping plate with tee slot and parallel alignment mechanism.
- Dual safety switch with emergency stop button.

3.7.4 Compressed air

- Dry compressed air, 7 bar max. (105 PSI).

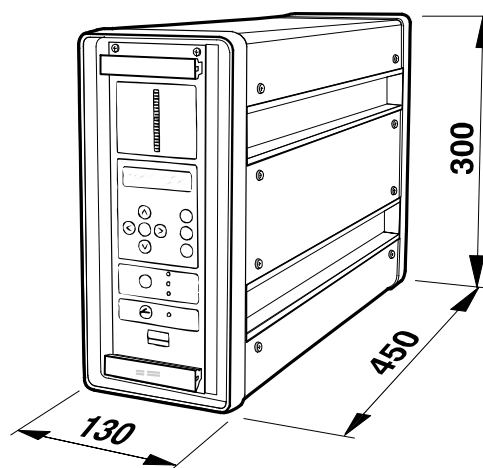
3.7.5 Dimensions

- see fig. page 3-6.

3.7.6 Weight

- Weight 92 kg

3.8 Technical data of the Ultrasonic Generator



6

Dimensions in mm

3.8.1 Design

- Flexible modular system with various plug-in modules type GM.
- Well arranged and simple input of parameters with a 2-line LCD display.
- Optimum efficiency and low power loss thanks to microprocessor controlled frequency adjustment.
- Microprocessor-controlled amplitude stabilizer in real time, with changing load conditions and mains fluctuations.
- Detection of system malfunctions and output of differentiated fault messages on the LCD display.
- Electronically adjustable output amplitude.
- Variable start-up characteristic (softstart) for optimum adaptation to large-volume welding tools.
- Interface for PLC.

3.8.2 Available generator modules

Type	max. power
GM 20-1000	1000 W
GM 20-1500	1500 W

3.8.3 Connected loads

- 230 V 50-60 Hz
- Maximum current consumption: 8 A

3.8.4 Dimensions

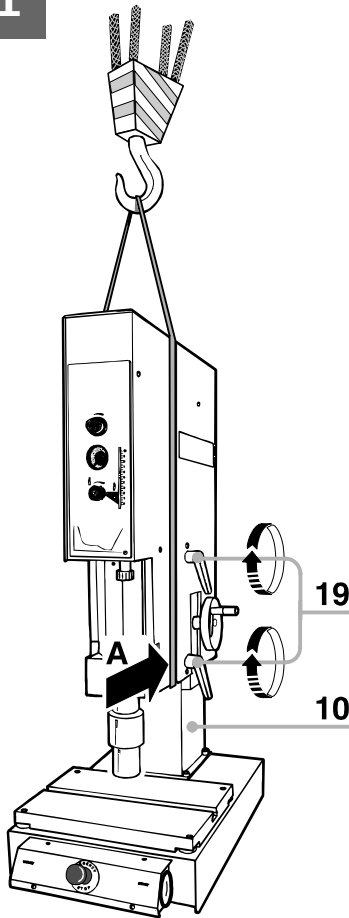
- see Fig. page 3-8.

3.8.5 Weight

- Weight: 7 kg

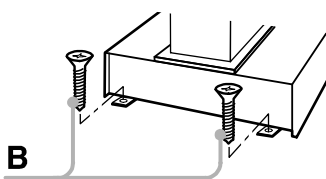


1



2

Rear view



4 Transportation



Transportation jobs may only be performed by specially trained staff.



Transportation instructions on the packaging must be observed.



Clamping levers (19) must be clamped in the direction shown.



Push transportation belt in direction A up to the square column (10).

1

1

4.1 Unpacking/receiving inspection

The Multipress is screwed to the pallet at the rear for purposes of transportation. Release the transport locking screws (B) before internal transportation (see Fig.2).

2

The shipping container used for our machines and units withstands the normal wear and tear of road, rail and air transportation.

After receiving the consignment, check whether all the parts conform to the packing list and look for any visible signs of damage. If you discover any damage, notify the carrier immediately and keep the packaging as evidence.

4.2 Damage during transit

The carrier is responsible for any damage incurred during transit. A complete report containing an exact description of the damage must be submitted to the carrier as the basis for the damages claim.

Incidents of damage or loss involving goods delivered by us must be reported to us immediately and they must be confirmed with a copy of the above mentioned report.

If the delivery is arranged carriage paid or CIF by RINCO ULTRASONICS AG, the damaged consignment will be replaced if necessary and claims will be levelled against the relevant transit insurance.

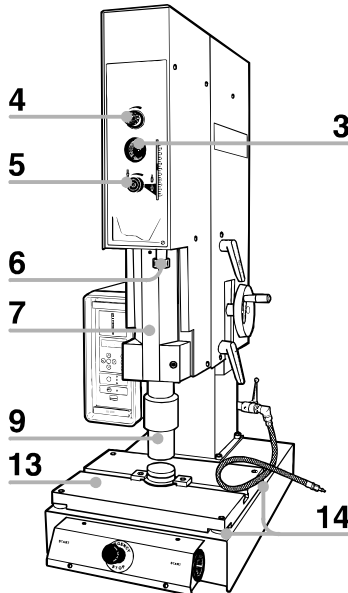
4.3 Positioning the plant

The location of the unit is important. In order to guarantee a long service life, the unit should be installed in clean surroundings. Make sure that the electronic equipment is mounted in a vibration-free environment.

The factory settings are performed at 20°C. The ambient temperature can range between 10° and 45° during operation.



1



5 Controls and indicators

5.1 Multipress

3 Pressure gauge

The pressure gauge shows the set maximum welding pressure.

4 System pressure controller

The system pressure controller serves to adjust the welding pressure. To set the nominal value, pull out the setting knob and push it in again to fix it in the required position.

Maximum inlet pressure: 7 bar

5 Speed throttle

The speed throttle enables the lowering speed of the feed cylinder to be continuously adjusted over the last 30 mm from the home position. The speed of the return stroke is not adjustable!

6 Vernier screw for the depth stop

The distance between the horn face and the fixture can be continuously adjusted by means of the depth stop with scale ("0.1mm" increments).

7 Converter housing

The converter housing contains the vibration system with the electrical supply leads.

9 Horn



Never alter tuned horns by machining. This can cause subsequent damage to the vibration system and to the generator!

The horn is the actual welding tool; it has been tuned to the resonance frequency by the manufacturer.

13 Clamping table

The integrated T-slot enables rapid centering and fastening of the workpiece mount with the supplied clamps.

14 Parallel adjusting nuts

The parallel adjusting nuts allow an extremely exact alignment of the clamping table (13) and hence the alignment of the fixture in relation to the horn face.

15 Dual safety switch

The welding cycle is triggered manually by pressing the two buttons simultaneously. The two buttons must be actuated within 0.3 s of each other.

This ensures that the operator is unable to reach into the area of the tool during the welding operation.

This precaution serves the interests of safe operation and may not be removed or modified in its construction!



Observe any statutory safety regulations in force in your country!

Failure to observe these regulations will exempt the manufacturer from all liability for injury to persons or damage to materials!

16 EMERGENCY STOP button

Pressing the EMERGENCY STOP button stops the press immediately.

The complete power supply is interrupted.

After pressing the EMERGENCY STOP button, it remains locked.

- To unlock the EMERGENCY STOP button:
 - Pull the head of the button upwards into its initial position.

18 Scale for feed

Scale for reading and setting the actuator.

18.1 Trigger marking

If the trigger marking is passed, the safety switch is activated. The cycle now continues automatically without the dual safety switch being held in.

19 Clamping levers for fixing the press head

Clamping device for fixing the press head after rough adjustment.

20 Handwheel for height adjustment

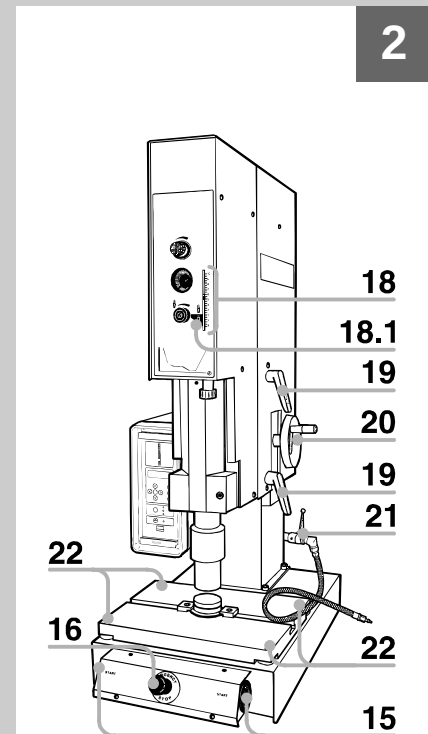
The handwheel is used to adjust the height of the press head. The handle of the handwheel can be swung in.

21 Compressed air connection valve

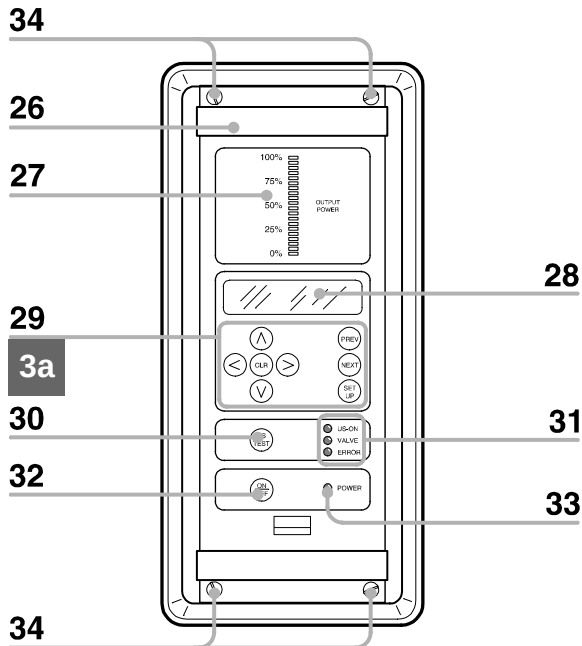
Connection valve for joining up the unit's compressed air system to the local compressed air network. The valve serves to separate the energy between the local compressed air network and the unit's compressed air system.

22 Clamping screws for clamping plate

Socket setscrews for releasing and fastening the clamping table for parallel alignment.



3



5.2 Ultrasonic Generator

26 Generator module grips

If necessary, you can pull out the generator module by holding these grips. The fastening screws (34) for opening the generator module are located above and below the grip bars.



The generator module is never to be pulled out or plugged in while mains is connected. (high voltage)

27 LED bar

This display indicates the power supplied during the welding operation. When the horn is idle (vibrating freely in the air), the display should not rise above the 25% mark.

An error message will be issued if the 100% mark is exceeded.

After the welding operation a flashing LED indicates the peak power supplied.

28 2-line LCD display

The LCD display shows:

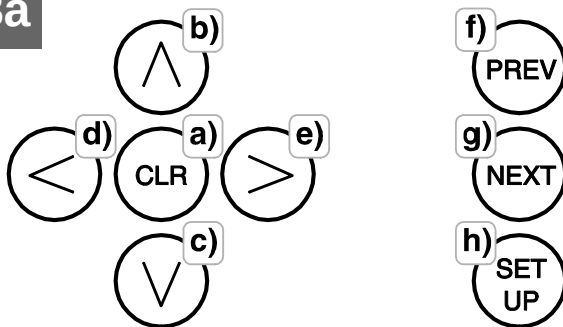
- Welding parameters
- Error messages
- Operating conditions

29 Input keypad

Using this keypad you can

- activate generator functions.
- change welding parameters.

3a



3a

- a) zeroes, display
- b) increase number
- c) decrease number
- d) select number to the left
- e) select number to the right
- f) return by one program line
- g) to next program line
- h) enter / exit program

30 Key "US-TEST"

Key to activate ultrasonics test. The display shows the current horn frequency. If the key is activated for more than 5 seconds, the error message comes on.



Do not touch horn.

31 LED

- "US-ON" Ultrasonics active
- "VALVE" Solenoid valve active
- "ERROR" Error output active

32 Key "ON/OFF"

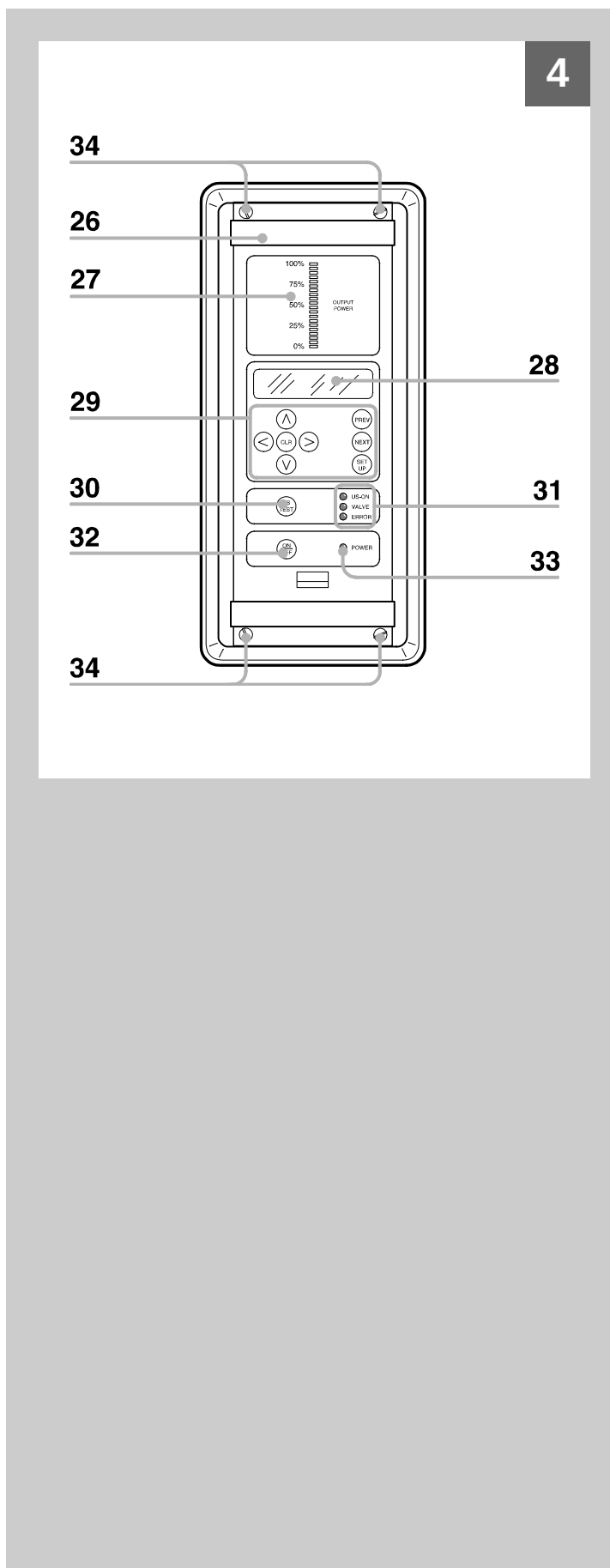
Mains switch.

33 LED

"POWER" indicator.

34 Fastening screws

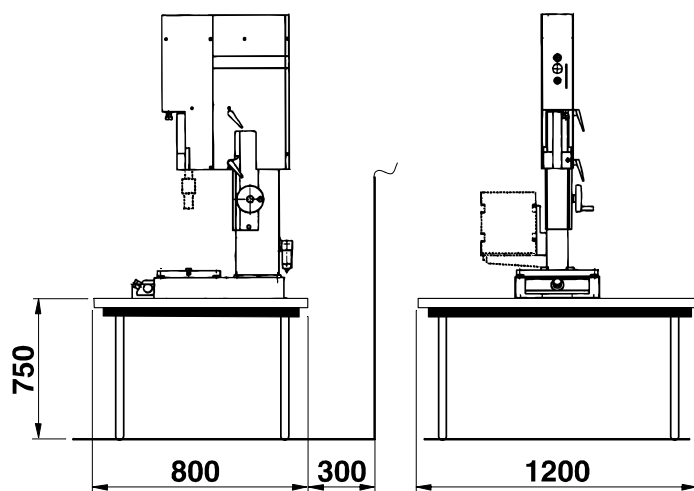
Must be locked in operation !



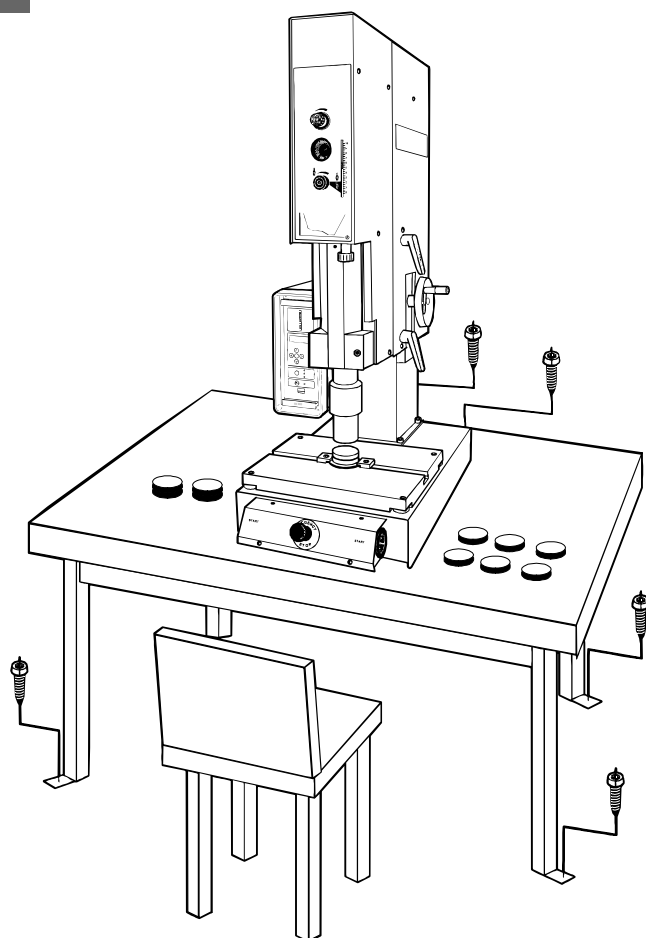




1



2



6 Initial start-up

6.1 Selecting a location

Choose a location that fits the following criteria:

- Clean surroundings
- A level and solid standing surface
- Vibration-free seating for the electronic units
- Ambient temperature:
in operation: 10 °C - 45 °C
for adjustments: 20 °C

6.2 Space requirement

The location chosen for the press should provide enough room for carrying out maintenance and repair jobs.

Minimum dimensions for the place of installation see Fig.1.

6.3 Work-station

The sketch shows an example of how a work-station can be arranged.

1

2

6.4 Assembling and connecting up the units

To prepare the units for operation, carry out the following steps:

2

1. Anchor the work bench and screw the Multipress to the rear as shown in Fig.2.
2. Connect up the cables between the press and generator.



Be sure to fit the power connection with a grounded connector.

3

3. Plug the unit plugs in the sockets of the Generator:

- 1 *STO1 Actuator*
- 2 *STO2 Start (optional)*
- 3 *STO3 Interface (optional)*
- 4 *STO4 Converter connection*
- 5 *STO5 Power connection*



Compressed air connection: 7 bar maximum.

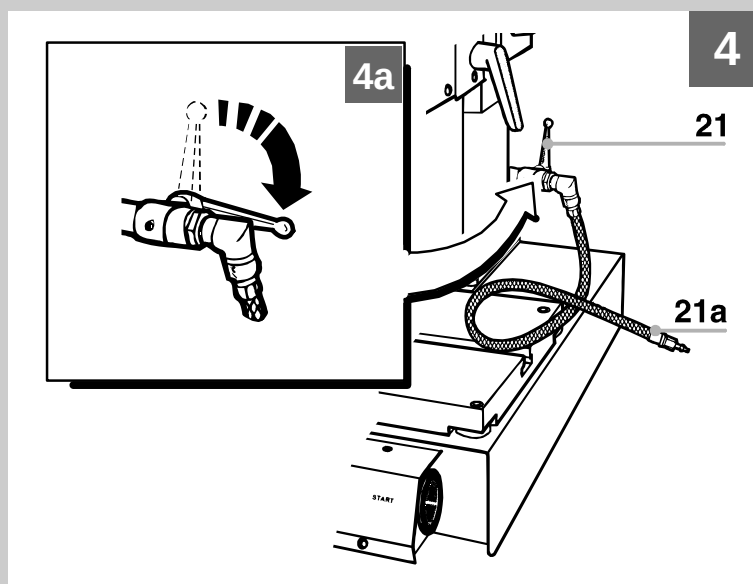
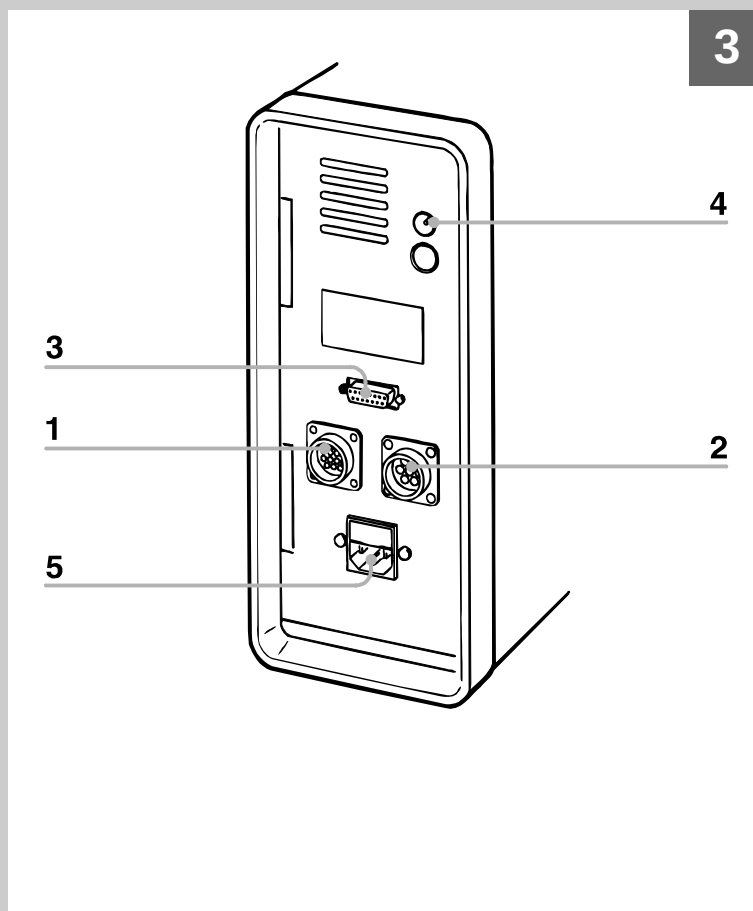
4

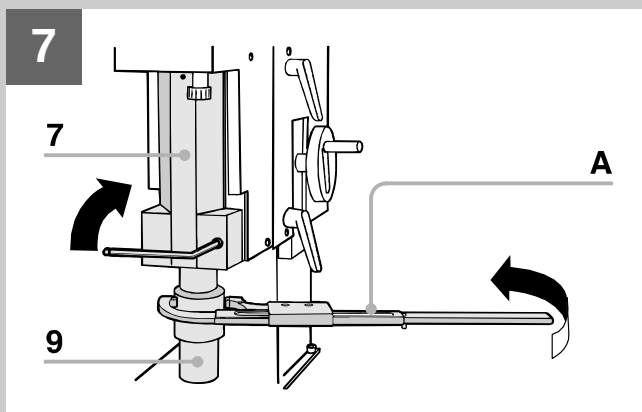
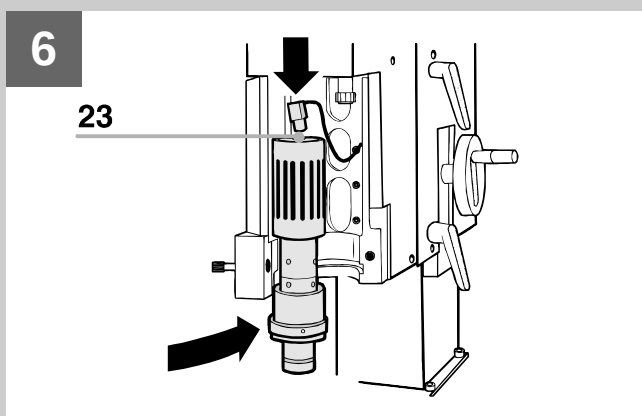
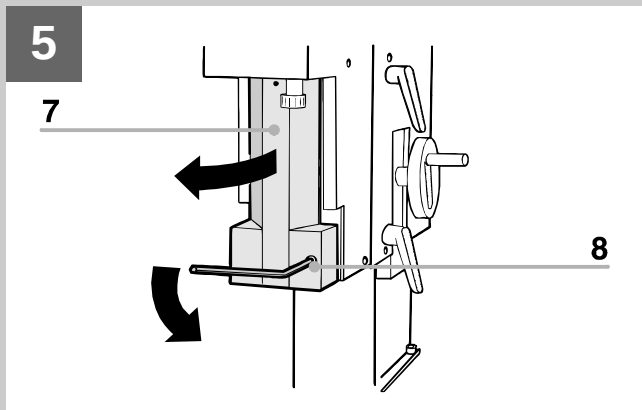
Turn compressed air valve (21) to vertical position (closed).

4. Connect compressed air tube (21a) to the available compressed air network.

4a

5. Move compressed air valve (21) to working position (Fig. 4a).





6.5 Installing the vibration system



Make sure you switch off the voltage supply at the generator before installing the vibration system (Power OFF) !

1. Release the screw (8) with the socket wrench supplied (size 6 mm).

5

2. Open the cover (7) of the converter housing.

3. Plug the RF plug into the RF socket (23) of the converter.

6

4. Insert the vibration system into the converter housing from the front.

5. Re-close the cover (7) of the converter housing and fasten it with the socket wrench.

7

6. Screw in the horn (9) and tighten it with the special wrench supplied (A).



Tightening torque: 30-40 Nm

The vibration system is now ready for operation.

6.6 Setting up



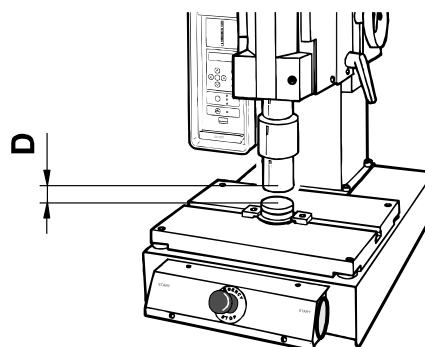
Precondition: Horn must be in the upper home position.

8

1. Position the locating fixture with inserted welding object.
2. Measure stroke distance "D".
(e. g. 20 mm)

D

8



9

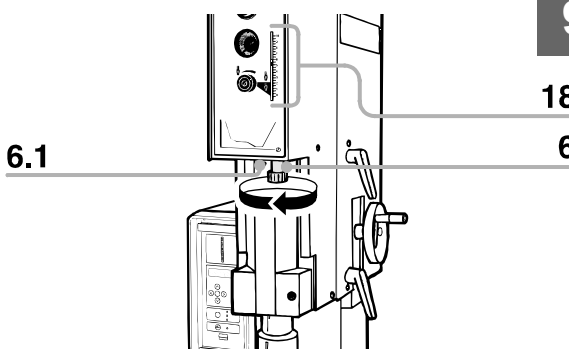
3. Loosen the knurled screw (6.1) and adjust the stroke with the depth stop (6); check on the scale (18).
4. Fasten the knurled screw again.

6.1

9

18

6



10

5. Release the clamping levers (19) and move the press upwards by means of the height adjustment facility (20), so that the horn cannot collide with the welding object when the stroke is performed.
6. Tighten the clamping levers again.

10

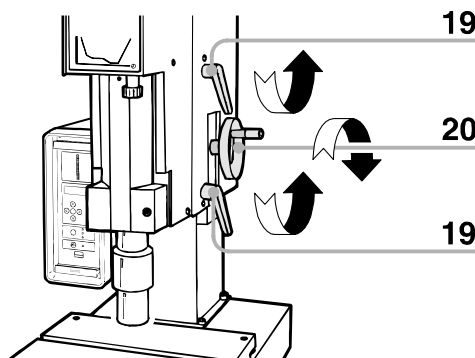


Attention: if the horn is not positioned high enough, there will be a risk of collision!

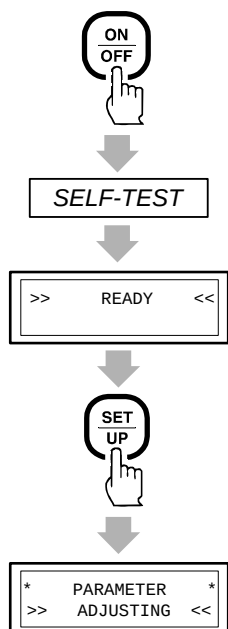
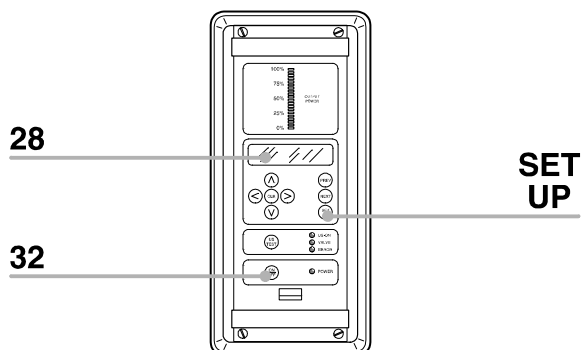
19

20

19



11



Do not touch horn!

11

7. The unit is switched on by pressing the "ON/OFF" key (32).

8. The message

>> READY <<

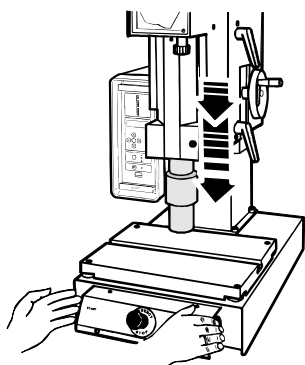
appears on the display (28) after the self-test.

9. Press the "SETUP" key to go to the

* PARAMETER
>> ADJUSTING <<

Mode.

12

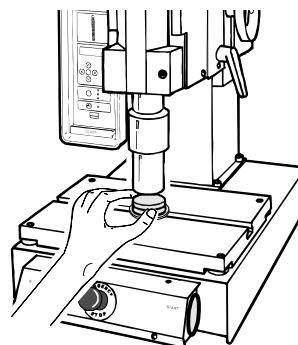


Do not place work locating fixture with welding object under the horn.

10. Actuate dual safety switch to lower press.

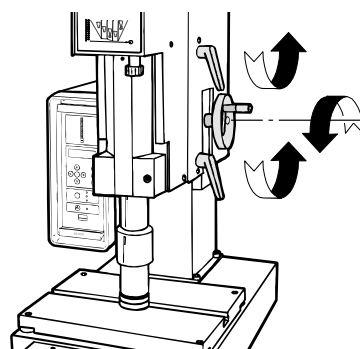
12

- 13** 11. Center the fixture containing the object to be welded under the horn.



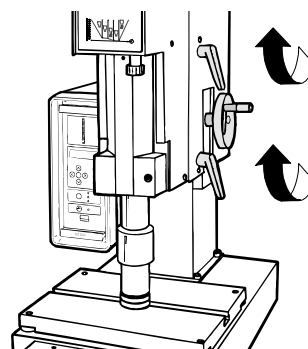
13

- 14** 12. Release clamping levers and lower the press **gently** onto the object to be welded using the height adjustment facility.



14

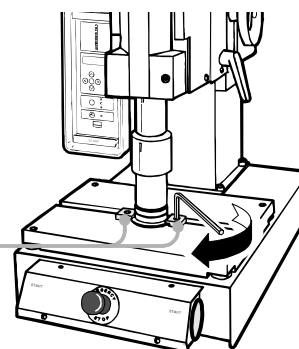
- 15** 13. Tighten clamping levers.



15

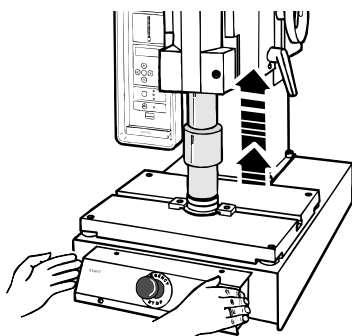
- 16** 14. Fasten clamps (12) using the socket wrench supplied.
15. First tighten both sides slightly, checking to see if the centering is still correct, then tighten fully.

12



16

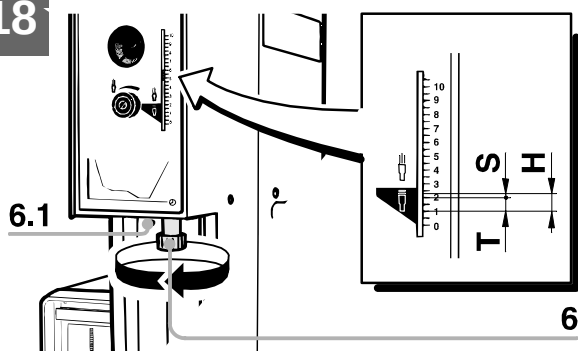
17



16. Move press to upper neutral position using the dual safety switch.

17

18

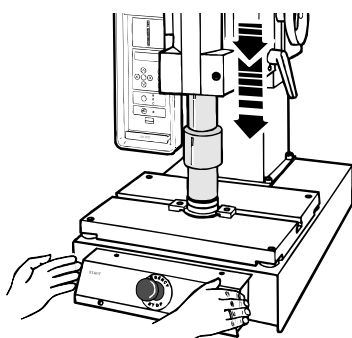


17. Release knurled screw (6.1) and raise depth control stop by the approximate weld depth (S) by turning to the left.

18

18. Lock the stop with knurled screw (6.1).

19



19. When the press is lowered again, the centering of the part is checked.

19



Attention: the horn should not touch the fixture when the press is lowered if there is no workpiece in place.

20

20. Press the "NEXT" key to enter the welding parameters.

21. Press the "SETUP" key to get the unit ready for trial welding.

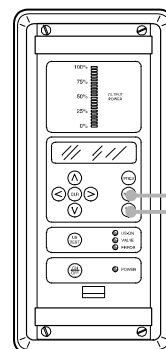


For further set-ups refer to "Parameter setup", chapter 7.1.4.



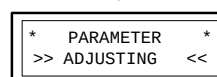
Large horns can be inserted from the front together with the press in the extended stroke position. In this case, the booster and converter are mounted on the horn beforehand.

20

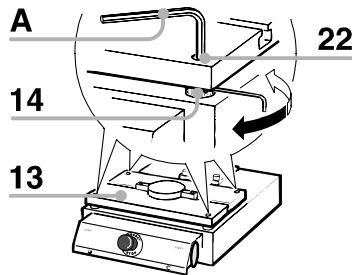


NEXT

SET
UP



21



6.7 Aligning the clamping table

The clamping table (13) was aligned parallel to the horn face in the factory.

Should the clamping table need readjusting, however, it can be aligned using the four parallel adjusting nuts (14).

Parallel adjustment:

1. Release setscrews (22) using socket wrench (A).
2. Set parallel adjusting nuts (14) according to requirements, as shown in the illustration.
3. When the adjustments are completed, re-tighten the setscrews (22).

21

6.8 Determining the welding data

Ultrasonic welding requires a knowledge of the interrelationships between the individual functions. Since the functions of the various elements interact, it is important for them to be exactly coordinated.

Objects which require welding vary so much in their properties, in the geometry of their parts, in their materials and in their surface conditions that it would be quite inadequate to determine the welding parameters once only. These need to be determined anew for each object to be welded.

The most important variable settings of the ultrasonic welding unit are:

- Amplitude
- Contact force
- Welding time
- Triggering
- Lowering speed

It is quite possible to achieve identical welding results with different settings, e.g.:

- high contact pressure and short welding time, or
- long welding time and low contact pressure.

Recommendation:

To be able to achieve successful results repeatedly, note the established setting parameters in a set-up log.

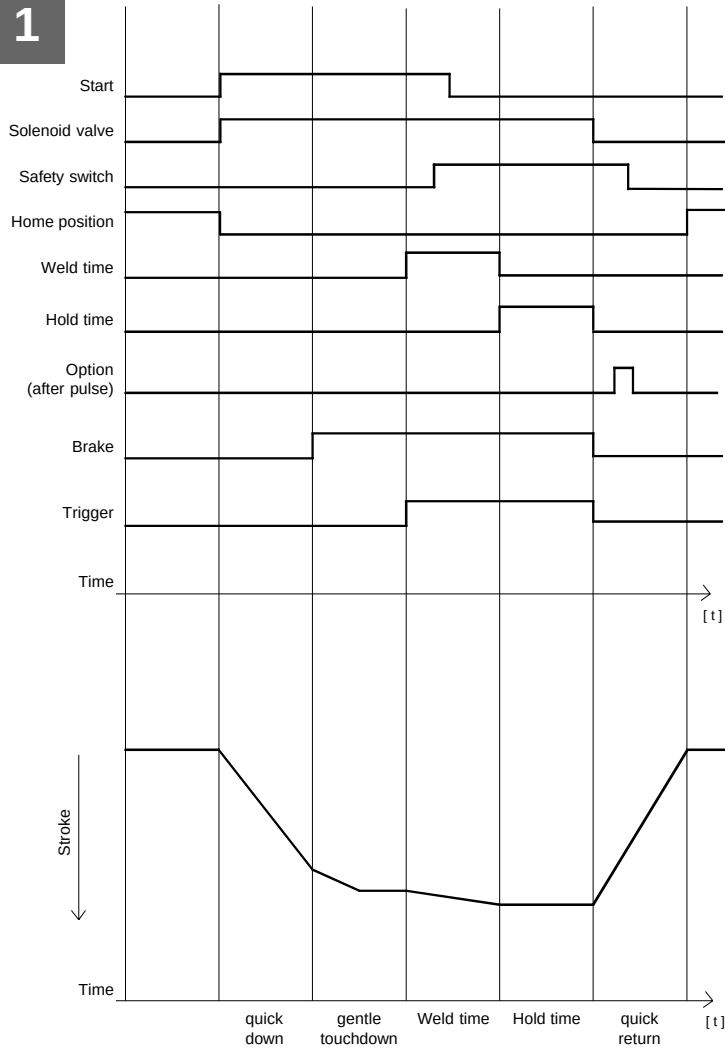
Do not change several settings simultaneously because they will influence each other. This makes it more difficult to keep track of adjustment steps.

6.9 Switching off

1. Switch off the generator with the "ON/OFF" key.
2. Move the compressed air lever to the vertical position (closed).



1



7 Operation

7.1 The welding operation sequence

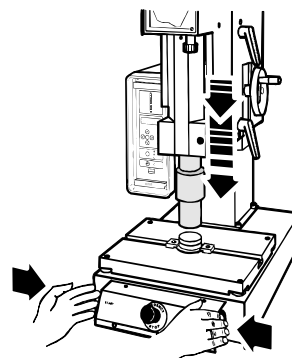
7.1.1 Weld cycle

7.1.2 Work cycle

2

1. Press both start buttons within 0.3 seconds to start the cycle.

The solenoid valve is activated and the actuator is lowered.



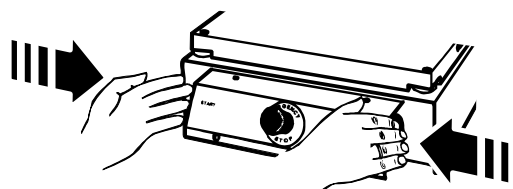
2

3

2. Keep the start buttons actuated until safety switch is reached or until hold time is ended.



If start buttons are released too early, the actuator moves back to the home position. An error message appears.

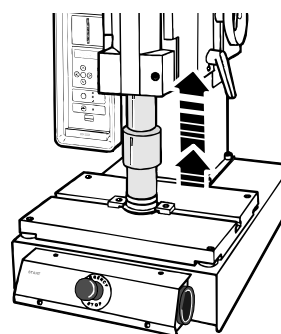


3

4

Welding is actuated by the *TRIGGER*. As soon as the welding and hold time have run out, the actuator moves back to the home position.

Options: US-STOP
 AFTER-PULSE



4

7.1.3 Optimization

To optimize the welding operation:

- only ever change one setting at a time
- assess the welding results after each changed setting.

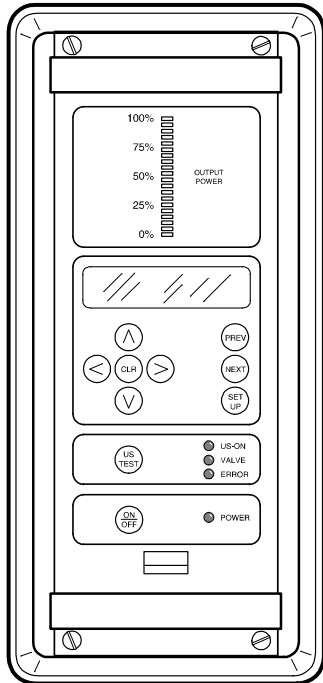


Never change several settings simultaneously!

When several settings are changed simultaneously, it is very difficult to establish which changes have actually affected the welding results.



5



7.1.4 Parameter setup

Setting parameters are available according to initialization of generator.

They can be modified as required.

For activating the parameter setup see following pages.

Parameters to be set up

Setting [ADJUSTING :]
Part counter [PART :]
Welding time [WELDTIME :]
Hold time [HOLDTIME :]
Trigger [TRIGGER :]
After-pulse [AFTERPULSE :]
Amplitude [AMPLITUDE :]



It is advisable to record the respective changes in a set-up log in order to be able to return to existing settings whenever necessary.

7.1.5 Description of setting parameters

Setting [ADJUSTING :]

- Press both start buttons within 0.3 seconds to lower the actuator. Keep the start buttons actuated until safety switch is reached. Press start buttons again to move actuator back to the home position.

Part counter [PART :]

- The part counter steps up by one after each correct weld. Press CLR key to reset part counter.
- Maximum display: 9999999

Welding time [WELDTIME :]

- Duration of welding.
- Setting range: 0.00 - 9.99 s



This parameter is operative only if the function [WELDTIME: TIMER] is operative in the * SYSTEM- -INIT *.

Hold time [HOLDTIME :]

- Upon expiration of the welding time the horn keeps exerting pressure on the welding object for the HOLD TIME.
- Setting range: 0.00..9.99 s

Trigger [TRIGGER :]

- Upon reaching the TRIGGER, the generator is started. The FU-trigger point is determined by a force sensor.
- Setting range: 0.0..9.9 FU

i This parameter is operative only if the function [TRIGGER: FU] is operative in the * SYSTEM--INIT *.

Trigger [TRIGGER :]

- Upon reaching the TRIGGER, the welding is commenced.
- Setting range: 0.01..3.99 s

i This parameter is operative only if the function [TRIGGER: TIMER] is operative in the * SYSTEM--INIT *.

After-pulse [AFTERPULSE :]

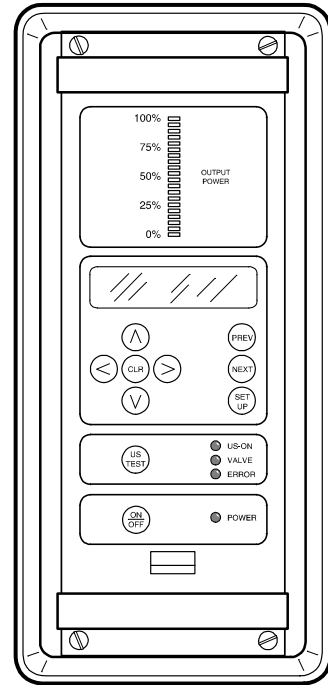
- After-pulse is triggered off 0.3 seconds after expiration of hold time. If the welding object still adheres to the horn, it can be released with the after-pulse.
- Standard setting: 0.00 s
- Setting range: 0.00 - 1.99 s

Amplitude [AMPLITUDE :]

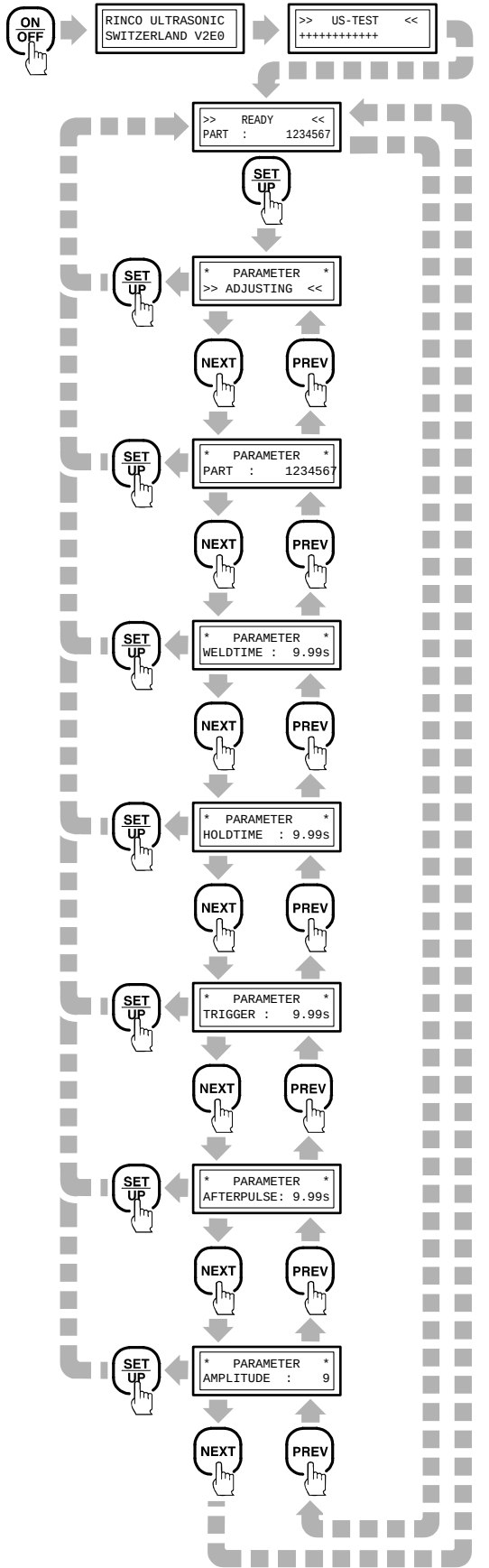
- The amplitude may be reduced from 100% to 60% by steps of 5%. A change of the booster may thus be avoided.
- For output amplitude: see table on page 14-3
- Setting range: 1 - 9 (9 = 100%)

i Maximum output power drops with a reduction of the amplitude.

6



7



7.2 Parameter set-up procedure



An ultrasonic vibration system must be connected.

Do not touch horn!

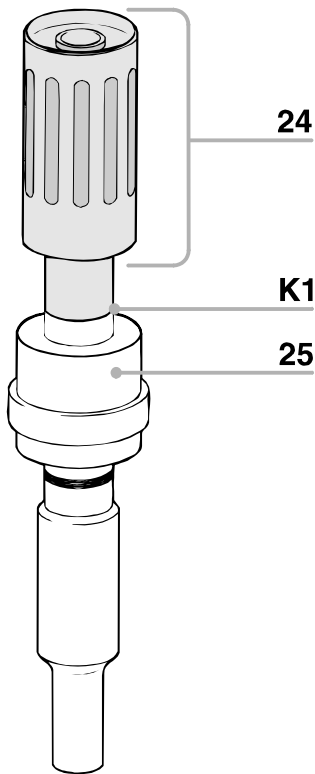
1. Press **ON/OFF** key.
2. The generator starts with a two seconds' self-test while warming up. After the self-test the vibration system is tested again for a ½ second.
3. Upon termination of tests the message

```
>>  READY  <<
PART :      1234567
```

appears on the display.
4. Press the **SETUP** key.
5. To move to the next parameter setting, press the **NEXT** key.
The display shows the next parameter.
To return to the previous parameter setting, press the **PREV** key.
6. Move to the required point on the display with the cursor keys **LEFT** (←) or **RIGHT** (→).
7. Increase the value with the **UP** (↑) cursor key or decrease the value with the **DOWN** (↓) cursor key.
8. To move to the next parameter setting: press the **NEXT** key.
The display shows the next parameter.
9. Exit the parameter set-up with the **SETUP** key.
The system is ready for welding.



1



8 Elements

8.1 Converter



The converter is a sensitive instrument.

Please handle with great care!

The converter (24) is the core of every ultrasonic welder.

A type C20-12 converter is used for the Ultrasonic Welding Press. It belongs to the category of piezo-electric converters.

Piezoelectric converters consist of several ceramic disks that change their size when an electric voltage is applied.

In the case of the ultrasonic welding converter, an alternating voltage with the nominal frequency (e.g. 20 kHz) is applied. This electric signal is converted by the piezoelectric elements into a mechanical vibration of identical frequency.

A mechanical vibration in the axial direction is thus available at the front end "K1" of the converter (24). The amplitude is usually too small to be used directly, so it is amplified by a booster (25).

The efficiency of a piezoelectric converter is extremely high. The small losses which occur during the conversion are noticeable in a rise in temperature of the converter.

Residual heat is dissipated by natural convection thanks to the special design of the converter.

Special applications require dissipation of heat by additional ventilation (optional).



The converter must not be warmed up to more than 60°C at the contact point "K1". Converter, booster, horn and generator may be damaged by overheating.

The converter must be fastened with a tightening torque of 30-40 Nm.

8.2 **Booster**

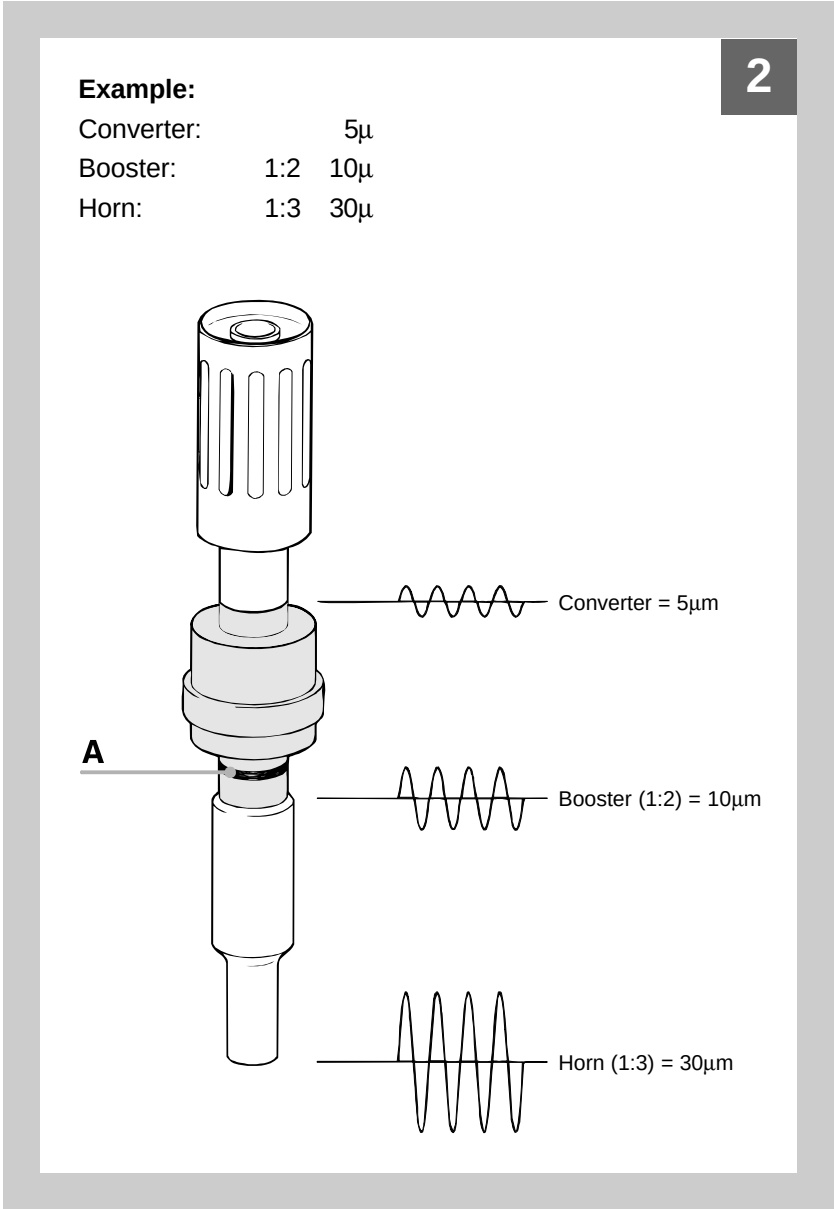
The correct amplitude at the horn is one of the most important factors for ultrasonics welding.

The geometrical form of the horn must match to the welding object. Finding the correct amplitude for the application is often difficult.

The booster intensifies the amplitude of the converter in a given ratio; 1:2 in our example.

The factor of reinforcement / attenuation is given in the corresponding ratio. The ratio is designated with a colour code and a numerical value (A). (see table)

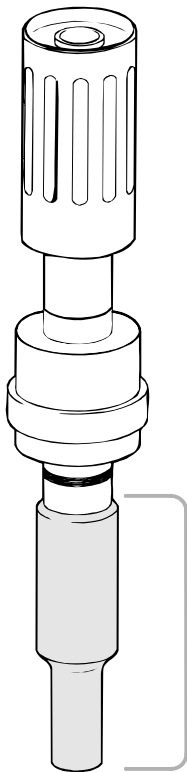
The booster must be fastened with a tightening torque of 30-40 Nm.



Ultrasonic welders of the 20 series are available with the following booster types:

Reducing Booster	Color	Material	Booster	Color	Material
1 : 0.5 1 : 0.6	blue violet	Aluminium Aluminium	1 : 1 1 : 1.5	green yellow	Aluminium Aluminium
other ratios on request			1 : 2 1 : 2.5 1 : 3	white black brown	Titanium Titanium Titanium

3



9

8.3 Horn



Any changes to the metallic body of the horn will affect its vibration characteristics and should not be performed without consulting the manufacturer!

The horn is the tool that transfers the ultrasonic energy produced by the converter to the welding object in the form of an intensive vibration.

Since workpieces come in a variety of forms, horns have to be adapted to the specific requirements.

The horn is an acoustic body tuned to the resonance frequency. This accounts for restricted shaping possibilities.

The geometrical form of the horn should be kept as simple as possible.

Other important factors in addition to the geometrical shape of a horn are:

1. The horn must be tuned to the resonance frequency of 20'000 Hz (± 50 Hz) at 20°C. During operation a tolerance of +150 Hz / -250 Hz is permitted.
2. For the horn to vibrate correctly it must be designed as far as possible to move in an axial direction at its transmission surface.
The aim is to produce pulses on the horn face that act as far as possible in an axial direction and which can be transmitted to the welding object.
3. The amplitude of the horn is determined by means of its design. For the production of horns it is vital to have a knowledge of the load capacity of various materials.

8.3.1 Horn materials

Horns are manufactured exclusively from specifically high-strength materials; namely high-strength aluminium, titanium and steel alloys.

The choice of material depends largely on the intended application.

Various factors are crucial for choosing the material:

1. The strength of the horn material in conjunction with the amplitude to be attained.
2. The surface condition of the material and its related surface finishing characteristics.
3. The ultrasonic transmission characteristics.
4. The heat conducting characteristics of the horn material.

Allowance must also be made for the fact that horns are subject to immense mechanical loads.

It is extremely important, therefore, to design the horn in such a way as to enable the plastic part to be joined under optimal conditions.

The horn surface may have a coating for abrasive plastics for longer service life.

RINCO has a long record and a lot of experience in horn manufacture.

Horns that are manufactured without the necessary theoretical and practical experience are bound to lead to unsatisfactory and poor welding results and hence to inferior product quality.



In some cases the vibration system and generator may be damaged.



The horn must be fastened with a tightening torque of 30-40 Nm.

8.4 Fixture

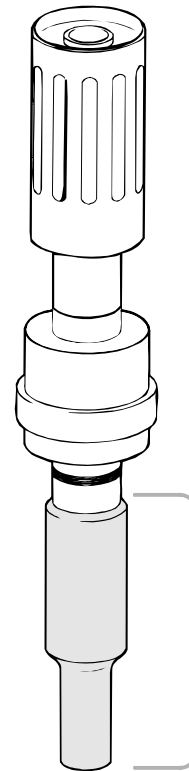
The fixture serves a variety of purposes:

- It holds the welding object in the same position throughout the welding operation.
- It simplifies the assembly process (laying up of various parts).
- It has a positive effect on the acoustic process of the ultrasonic welding.
- It prevents damage to the welding object surface.

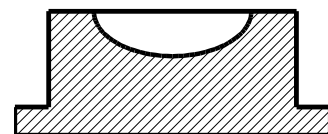
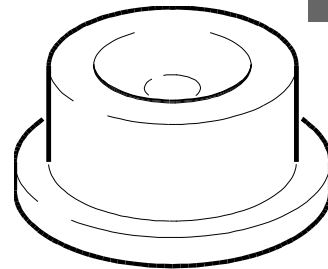
The degree of success and the level of quality depend in many ways on the design of the fixture.

It is therefore vitally important for the fixture and the horn to be produced by the same manufacturer. He knows the requirements to be met by the application.

4



5







9 Application examples

9.1 The weld

The typical profile for an ultrasonic weld serves two functions:
It is designed as a tongue and groove joint in order to

- facilitate the lay-up of work
- guide the two halves of the workpiece precisely during the processing operation.

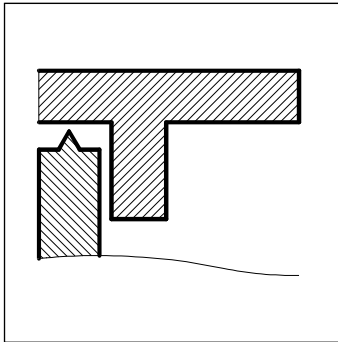
The energy director integrated in the contact zone acts as an energy concentrator, and at the same time it supplies the necessary molten mass for an optimum joint.

The weld profile is adapted to the particular case of application, i.e. there are several variations.

Machine set-up parameters such as welding force and amplitude are calculated to enable the top half of the workpiece to move in phase with the horn.

The bottom half lies in the fixture and is passive. This brings about a phase shift in the movement between the two halves of the workpiece, resulting in friction at the point of contact.

This highly intensive ultrasonic oscillation causes the point of contact between the two halves of the workpiece to melt instantly. The simultaneous input of force from the press, which lasts longer than the ultrasonic pulse, holds the welding halves of the workpiece until the molten plastic solidifies.

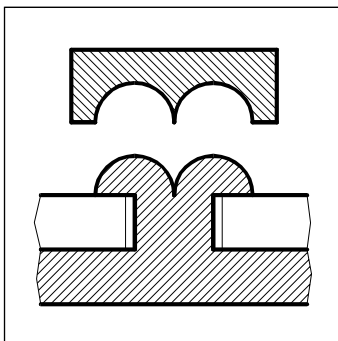


9.2 Rivet joints

Rivet joints are used among other things to join injection moulded plastic parts to parts made of a different material. Moulded spigots on the injection moulded part penetrate the foreign part that is to be riveted to it. The section projecting above the foreign part is then deformed into a rivet head using a pre-formed horn. The cavity in the horn tip must be designed to take up the volume of the displaced material. The amplitude of the horn must be set to result in complete decoupling between the workpiece and the horn surface.

This results in the generation of direct frictional heat at the point of contact between the plastic part and the metallic surface of the horn. Instant plastification takes place at this point. The resulting rivet head is given enough time to harden under the action of force from the press.

Multiple tools are often used for riveting operations in order to rivet parts at various points simultaneously.



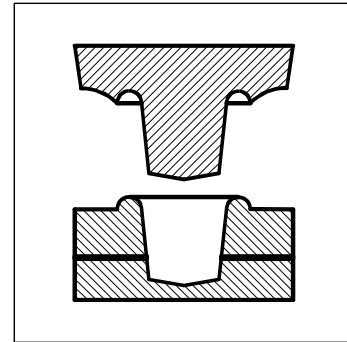
9.3 Spot welding

Spot welding is called for, for example, wherever large thermoplastic parts cannot be loaded under a welding press for practical reasons.

In these cases the welding head is taken to the object to be welded. The weld is then performed with a welding gun either manually or by robot. The advantage of ultrasonic spot welding is that the parts do not require any special preparations at their welding points (an energy director is not essential).

Even deep-drawn parts can thus be processed without difficulty. The ultrasonic tool is designed to generate a relatively high amplitude.

The tip of the horn is specially formed so that the advancing tip penetrates the half to be welded and the displaced material is caught and positively shaped in an outer ring.



9.4 Embedding of metal parts

Preformed openings to be firmly plugged by a threaded insert pin, connector or the like.

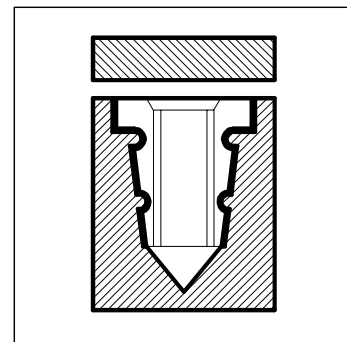
The sonotrode makes contact with the foreign part and sets it vibrating, the high intensity of its movement causing the plastic body to plasticize at the point of contact.

The penetrating movement executed simultaneously by the welding press displaces the now ductile material into the specially provided backtapers and cavities in the inserted part.

When the displaced material solidifies, the embedded part remains firmly trapped. It is thus invested with high tensile and torsional strength.

Advantage:

The assembly operation can take place subsequently at a less costly workstation. It is possible, therefore, possible for the injection moulding operation to take place fully automatically, whereas with the traditional insert moulding process it is always interrupted. Expensive plants can thus be put to optimum use.



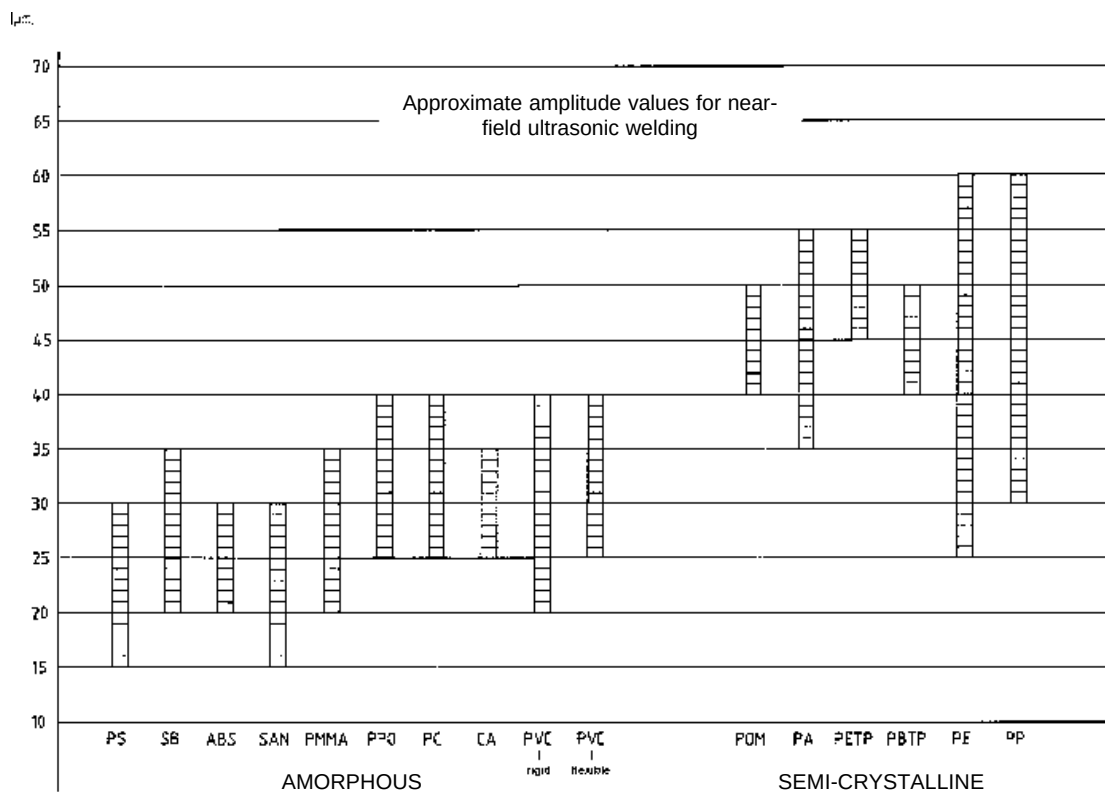
9.5 Designing of joint zones

The precise and expert design of joint zones ensures a correct layout of the parts and hence perfect and flawless welded products.

Design guidelines covering the entire spectrum of ultrasonic welding have been compiled and drawn up by RINCO Ultrasonics AG. Please ask for relevant data sheets

To ensure the correct layout of your parts, the RINCO team of specialists will be glad to assist by providing technical advice on the design of joint zones.

9.6 Approximate amplitude values for near-field ultrasonic welding





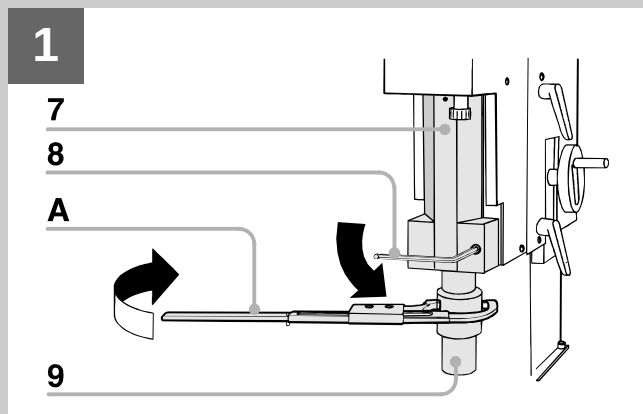
10 Retooling

10.1 Changing the booster



Make sure you set the power switch of the generator to "OFF" before opening the converter housing (7)!

1



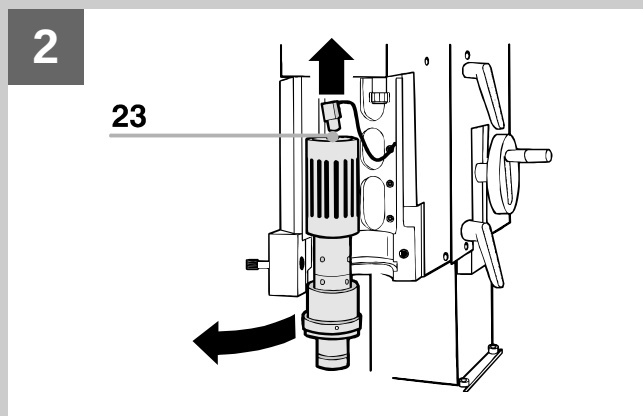
1. Release and unscrew the horn (9) with the special wrench (A) supplied.

2. Release the fastening screw (8) with a socket wrench (size 6 mm) and open the converter housing (7).

3. Move the complete vibration system out of the converter housing.

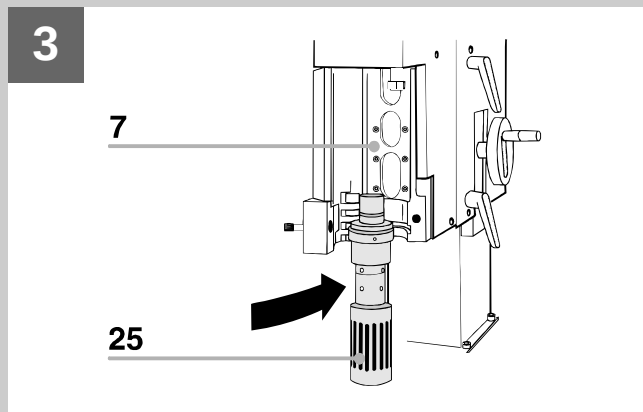
4. Pull the plug out of the RF socket (23).

2



5. With the booster (25) on top, re-insert the vibration system in the converter housing (7).

3

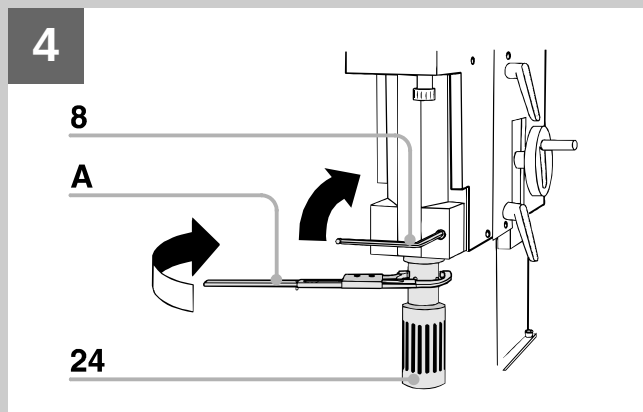


6. Close the converter housing and fix in position with the socket wrench (8).

7. Release the converter (24) with the special wrench (A) and unscrew from the booster.

8. If the thread jams, release the converter (24) with a slight tap on the wrench.

4



5

9. Re-open the converter housing (7)

10. Take out the booster (25).

11. With the thread for the converter pointing downwards, insert the new booster in the converter housing.

6

12. Close the converter housing (7) and tighten the fastening screw (8).

13. Screw the converter (24) into the booster and tighten with the special wrench (A).

7

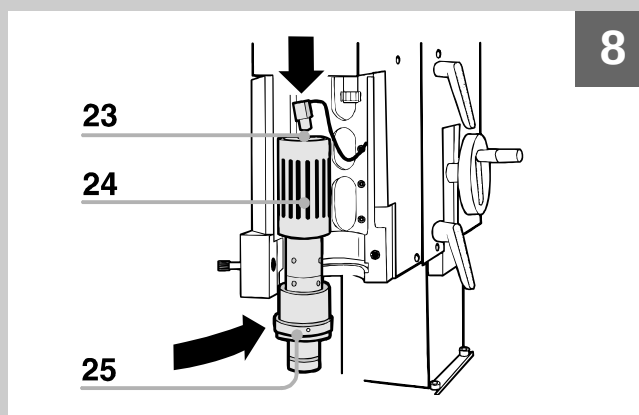
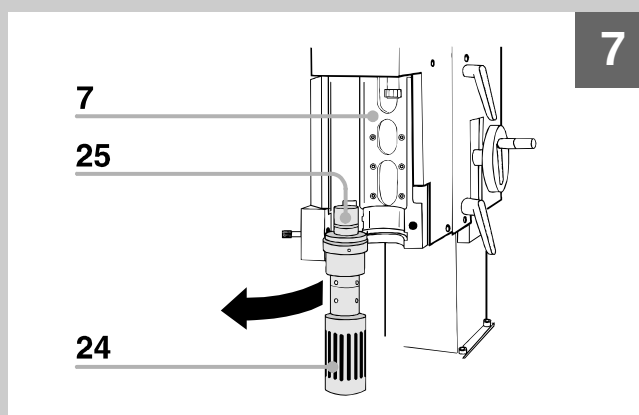
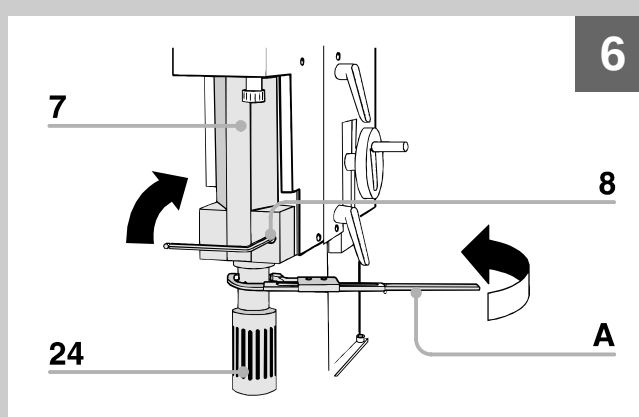
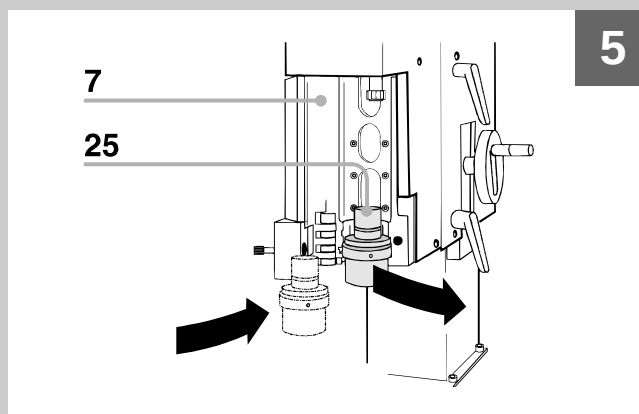
14. Re-open the converter housing (7).

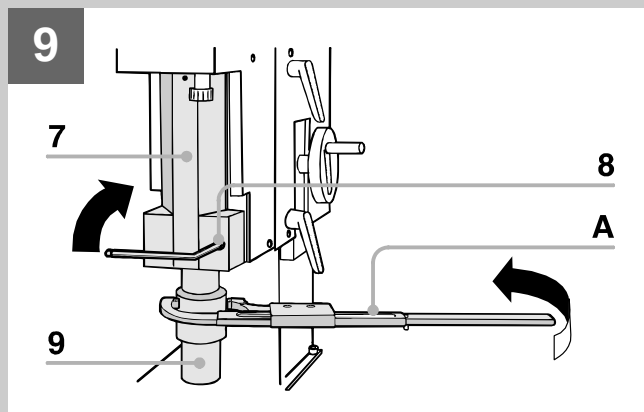
15. Take the converter (24) with the attached booster (25) out of the converter housing and turn round the other way.

8

16. Insert the RF plug in the RF socket (23).

17. With the converter (24) on top, re-insert the booster (25) in the converter housing.





18. Close the converter housing (7) and tighten the fastening screw (8).

19. Screw the horn (9) back into the booster and tighten it with the special wrench (A).

9

10.2 Parameter initialization

To prepare the Multipress and the Generator for their various tasks, the individual press functions are initialized according to the mode of operation via the generator control system.

To activate the system initialization:

- see "System initialization procedure".

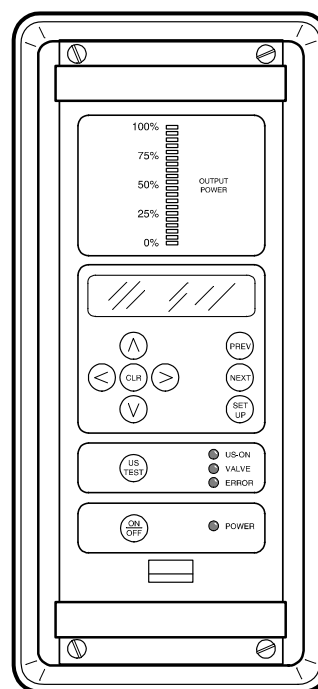


To activate the Parameter initialization, keep the *PREV* key pressed while the unit is switched on. Confirm the Parameter initialization by pressing the *CLR* key.

The Initialization is aborted by pressing the *SETUP* key.

In the * SYSTEM - - INIT * menu you can select the following functions:

- START [MANUAL/IMPULSE/AUTOMATIC]
- TRIGGER [FU/TIMER/RS/EXT./OFF]
- WELDTIME [TIMER/EXT.]
- VALVE [ON/OFF]
- US-STOP [ON/OFF]
- SOFTSTART [1-9]
- LANGUAGE [GERMAN/ENGLISH]
- AMPLITUDE [INT./EXT.]
- SDF [ON/OFF]
- TRIGGER [BEFORE/AFTER]

10


10.2.1 Description of selectable functions

START [MANUAL]

- The generator must be initialized for MANUAL.

TRIGGER [FU/TIMER]

- Triggering is possible with FU (Force Units) or TIMER.
- Standard setting: FU

WELDTIME [TIMER]

- The generator must be initialized for TIMER.

VALVE [ON/OFF]

- The generator must be initialized for ON.

US-STOP [ON/OFF]

- This function is active only if ON is initialized.
- Standard initialization: OFF
- A signal at input 2 or 3 will switch ultrasonics off. A delay is possible by means of an after-pulse. If no signal occurs, the ultrasonic vibrations are switched off when the welding time has been reached. An error message comes on.

LANGUAGE [GERMAN/ENGLISH]

- Standard setting: ENGLISH

AMPLITUDE [INT./EXT.]

- If the unit has been initialized to INT, the amplitude can be selected via the submenu of parameters.
- Standard initialization: INT
- If the unit has been initialized to EXT, the amplitude can be selected from outside by means of the potentiometer or with a voltage of 0-5 V DC.

Option A

- By means of potentiometer 10 kΩ.

Option B

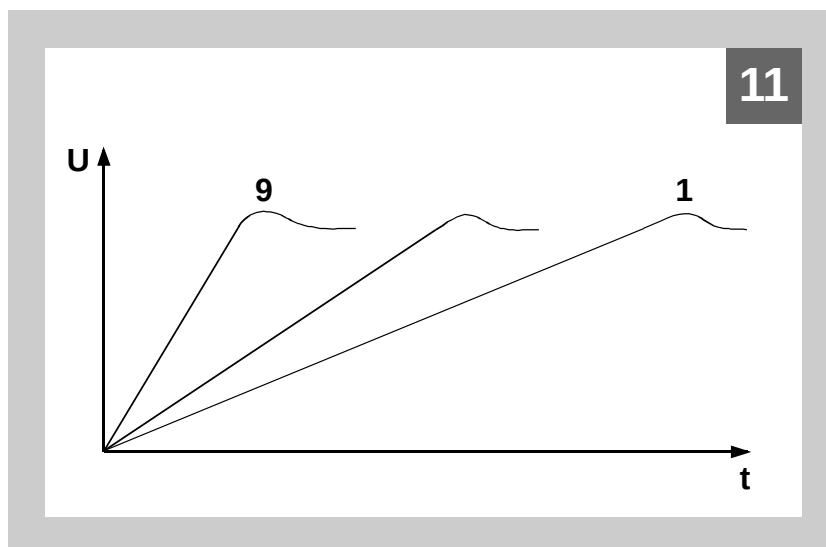
- With a voltage of 0-5 V.
- If the internal voltage is not used, GND 5 V should be connected to external GND.
- 0 V = 60%, 5 V = 100%

SOFTSTART [1-9]

- The duration of initial vibrations up to a full amplitude can be set in 9 steps.

- 1 *slow build-up for large-mass horns*
- 9 *rapid build-up for small-mass horns*

- Standard setting: 7
(see Fig.)

**SDF [ON/OFF]**

- This function is active only if initialization occurs with ON.
- Standard initialization: OFF
- Support for starting sympathetic vibrations of bulky horns.

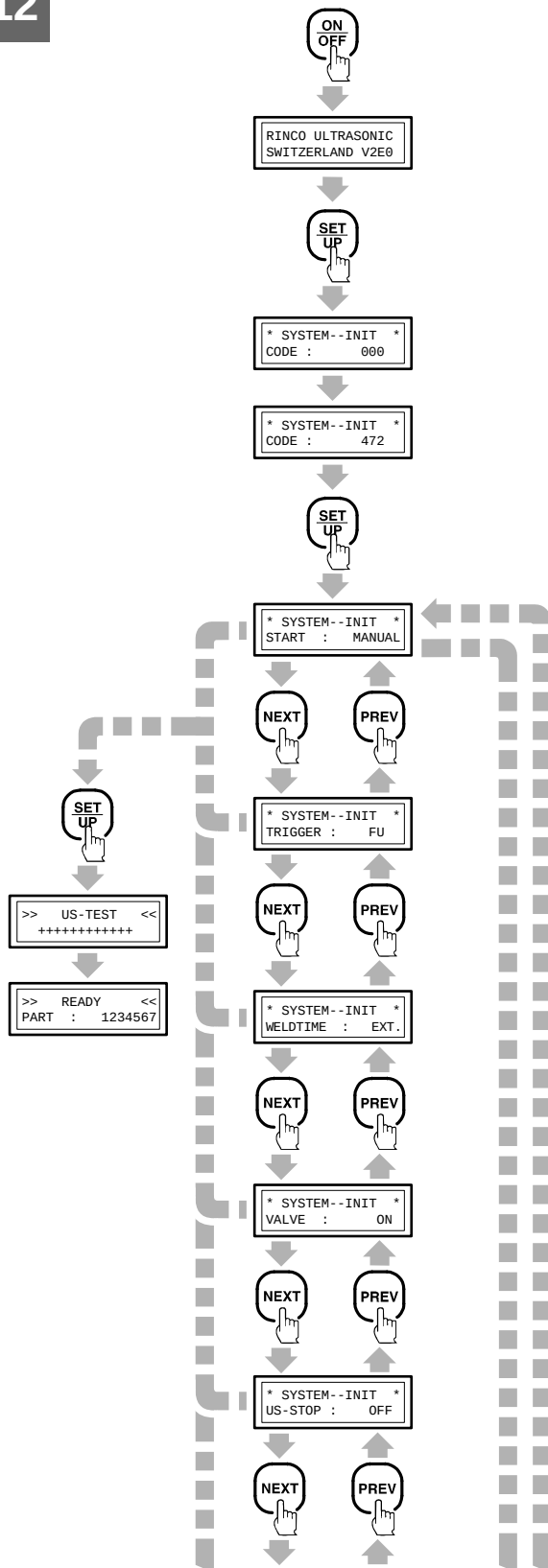
TRIGGER [BEFORE/AFTER]

- If set to AFTER, the trigger is only active after the safety switch is reached.
- If set to BEFORE, the trigger is active during the full stroke. This is necessary to weld distances of over 6 mm.
- Standard setting: AFTER

RESET

- A 24 VDC signal at the input RESET will abort the cycle. The machine returns to the home position and an error message comes on.

12



Continued on next page

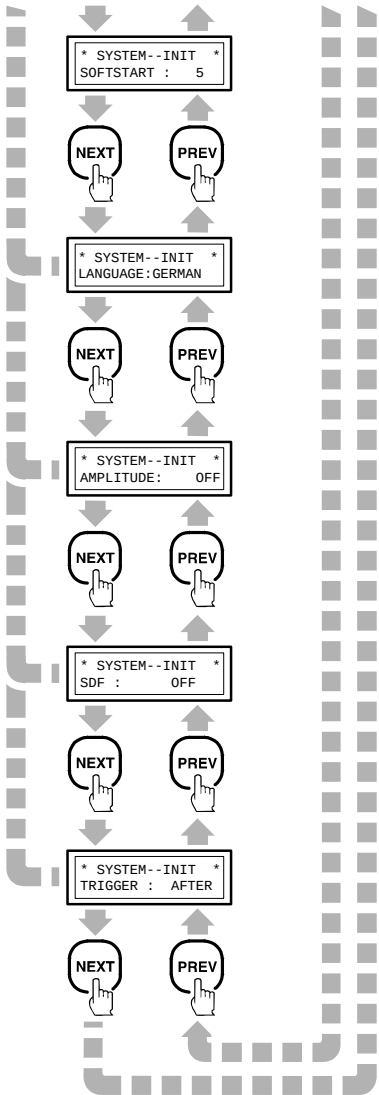
10.2.2 System initialization procedure



A vibration system must be connected.

Do not touch horn.

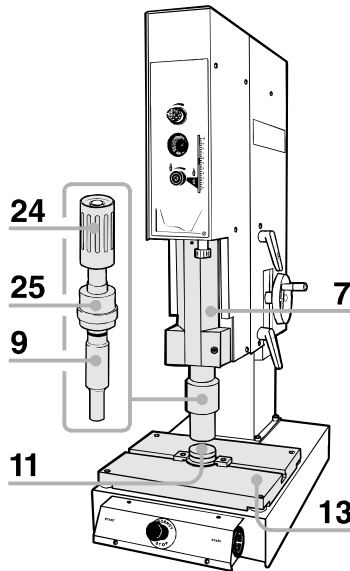
1. Press **ON/OFF** key.
2. The generator starts with a 2 Second self-test while warming up.
3. Hold the **SETUP** key during the self-test.
The display shows:
* SYSTEM--INIT *
CODE : 000
4. Set code 472 with cursor keys. confirm with **SETUP** key.
5. The various set-ups within the menus can be called up with the **CLR** key. Numerical entries are called up with the cursor keys.
6. Move to the next function. Press the **NEXT** key.
The display shows the next function selection.
To return to the previous function selection press the **PREV** key.
7. Exit the system initialization with the **SETUP** key. After you exit the system initialization, the system test will be executed.



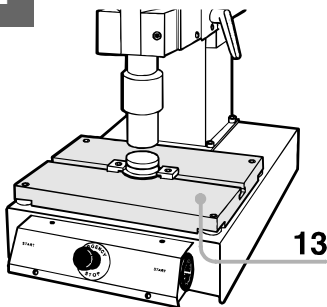




1



2



11 Cleaning and maintenance

11.1 General maintenance jobs



Cleaning and maintenance jobs may only be carried out by specially trained staff.



Before beginning maintenance jobs, make sure that all energy sources such as the power and compressed air supply are disconnected.



Attention: Never clean the keypad or plastic sheeting of the generator with caustic agents.

The Multipress and Generator require no special maintenance. However, regular cleaning of

- actuator,
- clamping table (13),
- fixture (11),
- horn (9),
- booster (25),
- converter (24),
- converter housing (7)

is essential for a long and trouble-free operation of the press system.

1

11.2 Clamping table

Clean clamping table (13) daily.

2

11.3 Pneumatic unit

When work is completed, move compressed air valve to the vertical position. In this way, no maintenance will be required.

11.4 Lubrication system

Maintenance-free.

11.5 Generator

Maintenance-free.

11.6 Vibration system



Work may only be carried out on the vibration system and converter housing when the mains voltage is switched off! High voltage!

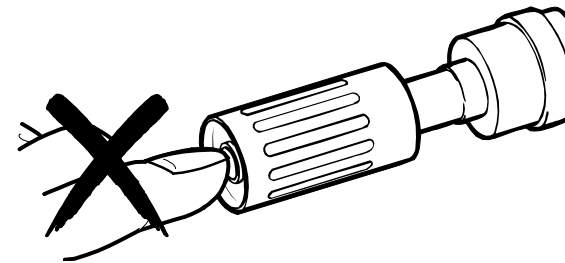
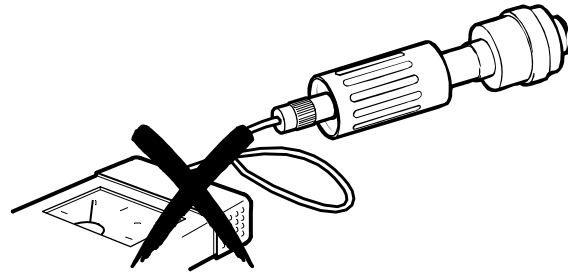
3



Avoid contact with the RF socket (23) of the converter.

Never connect any measuring instruments to the RF socket of the converter!

The converter is electrically charged even after switching off the generator.



11.7 Threaded coupling

4

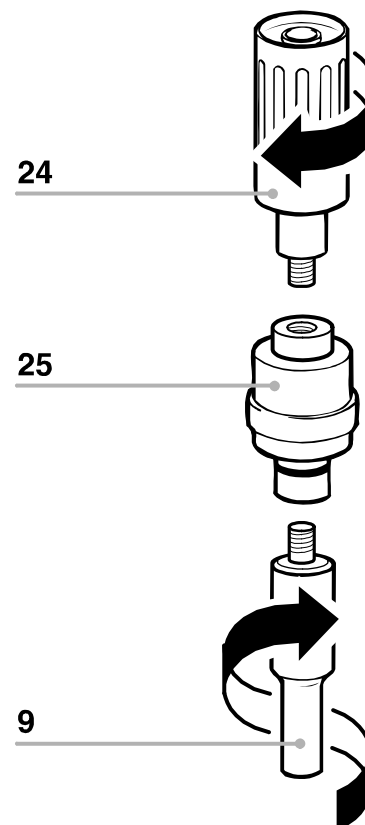
The converter (24), booster (25) and horn (9) are joined together by threading couplings.



Tightening torque: 30 - 40 Nm.

Black marks on the surface of the booster (25) or horn (9) are easy to remove.

1. Lay out a polishing cloth on a level surface.
2. Draw the blackened area over the polishing cloth.







12 Error messages and trouble shooting



Troubleshooting may only be carried out by specially trained staff. In case of doubt, contact the service centre or the manufacturer directly (see appendix).

12.1 Error messages / corrective action: switching on

Error	Possible cause	Corrective action
Generator cannot be switched on	- no voltage supply - EMERGENCY STOP button pressed - fuse faulty - module not in its housing	- insert mains plug - release EMERGENCY STOP button - test fuses F1-F5 - insert module and bolt together
After being switched on, the display shows: ERROR FREQUENCY	- vibration system not in use - RF cable not plugged in at vibration system or generator - error in vibration system: a) not screwed together firmly enough b) horn defective or outside the frequency c) booster defective d) converter defective	- use vibration system - plug in RF cable - screw together more firmly - replace horn - replace booster - replace converter

12.2 Error messages / corrective action: set-up and welding

Error	Possible cause	Corrective action
Horn is lowered but ultrasonics fail to start	- Trigger FU set too high - Trigger FU faulty	- set trigger lower - replace trigger
The parts are not welded closer together despite an increased welding time	- stop is set too low	- set stop higher
Press returns without welding	- safety switch not reached	- press start keys until safety switch is reached or hold time has run out

12.3 Generator error messages during operation

Error	Possible cause
"OVERLOAD 1" The generator was charged over 100% of nominal power.	- Trigger set too high - maximum welding pressure too high - Generator output too low for intended application - vibration system faulty
"OVERLOAD 2" The generator had to utilise to the full the final stage reserve capacity.	- amplitude too low at contact cut off during cutting operations - mains voltage below nominal tolerance
"TRIGGER" Trigger point not reached after 10 seconds.	- Trigger set too high - wrong Parameter initialization - Trigger system faulty
"FREQUENCY" Vibration system out of frequency range of generator.	- faulty horn or horn incorrectly tuned - faulty booster - faulty converter - faulty RF cable or RF cable not connected - faulty generator - frequency change due to coupling with the fixture
"TIME OVERFLOW" Operation time has exceeded.	- the <i>US-TEST</i> key was pressed longer than 5 seconds - the control time has been exceeded during an application using contact cut off.
"RESET" The plant returns to stop as a result of an external signal.	- start button released before safety switch was reached or before hold time has run out - hold time run out
"ABORT" Welding could not be carried-out according to programm.	- start button released before safety switch was reached or before hold time has run out - hold time run out
"HARDWARE"	- faulty safety switch - wrong triggering of ST02

Cancel error by pressing the **CLR** key.

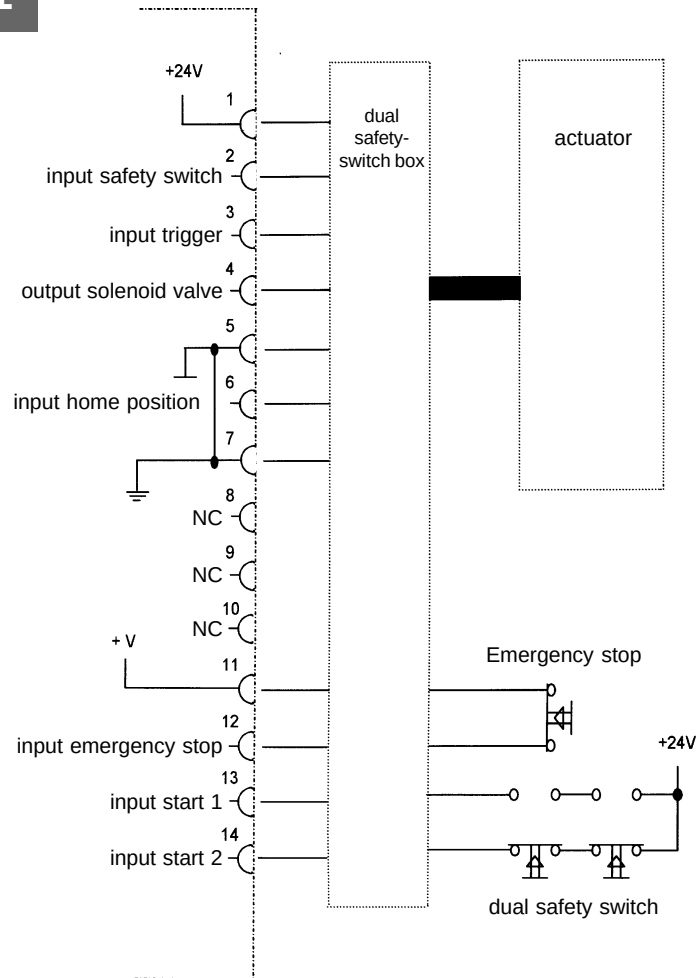


The "HARDWARE" error can only be canceled by switching the unit off.





1



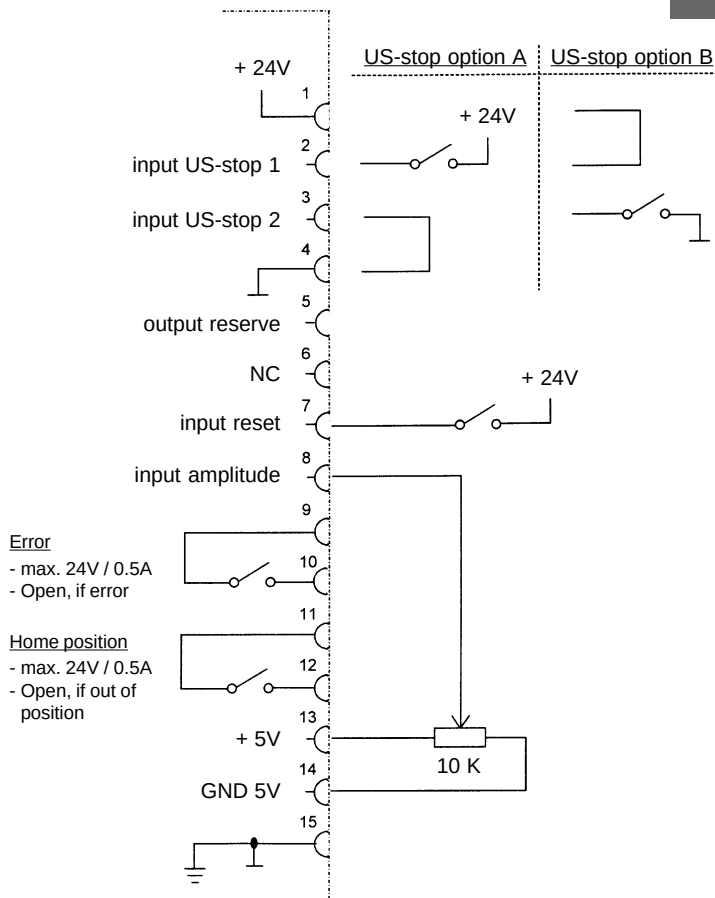
13 Electrical diagrams

13.1 Wiring diagram for SL housing

13.1.1 Actuator STO1

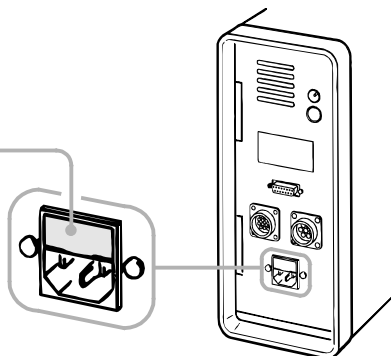
13.1.2 Interface STO3

2



3

F1/F2



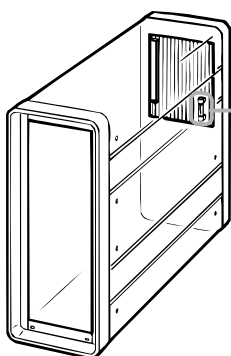
13.2 Fuses

Fuses are to be found in the following assemblies:

Power socket

4

F3

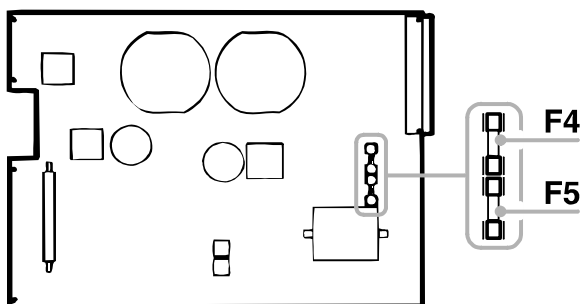


Bus print

5

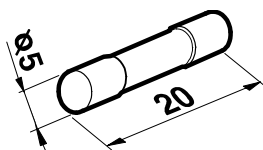
F4

F5



Generator module

6



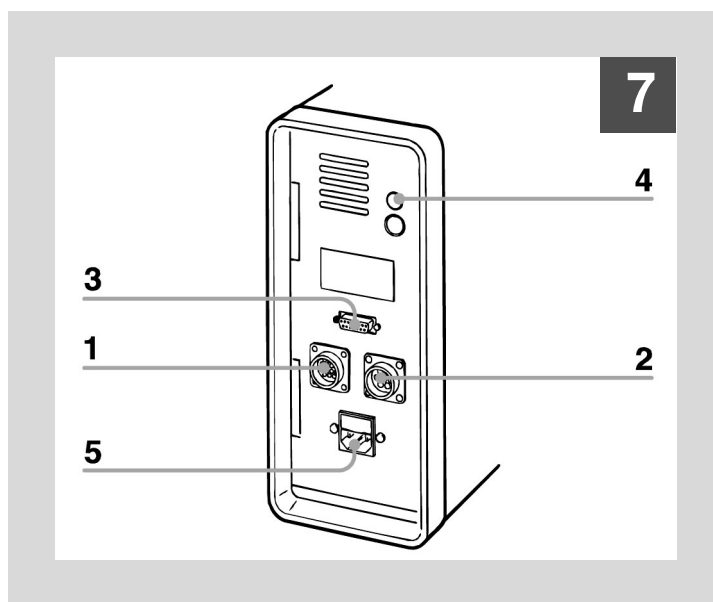
All fuse dimensions:
5 x 20 mm.

13.3 List of fuses

Generator	Power socket		Busprint	Generator module	
	F1	F2		F4	F5
GM20-1000	6.3 A/T	6.3 A/T	400 mA/T	6.3 A/T	100 mA/T
GM20-1500	8 A/T	8 A/T	400 mA/T	8 A/T	100 mA/T

13.4 SL20 Generator rear panel

- 1 ST01
- 2 ST02
- 3 ST03
- 4 ST04
- 5 ST05



13.5 List of unit sockets and connection plugs

List of unit sockets			RINCO order-No.
ST01	Appliance socket	14 pol. AMP	5445
ST02	Appliance socket	7 pol. AMP	5442
ST03	Appliance socket	SUB-D 15 pol.	5469
ST04	Appliance socket	Lemo 2	7255
ST05	Appliance socket	250V/8A	5053

List of connection plugs			RINCO order-No.
ST1	Plug	14 pol. AMP	5443
ST2	Plug	7 pol. AMP	5440
ST3	Plug	SUB-D 15 pol.	5446
ST4	Plug	Lemo 2	2647
ST5	Power cable	250V	depending on country

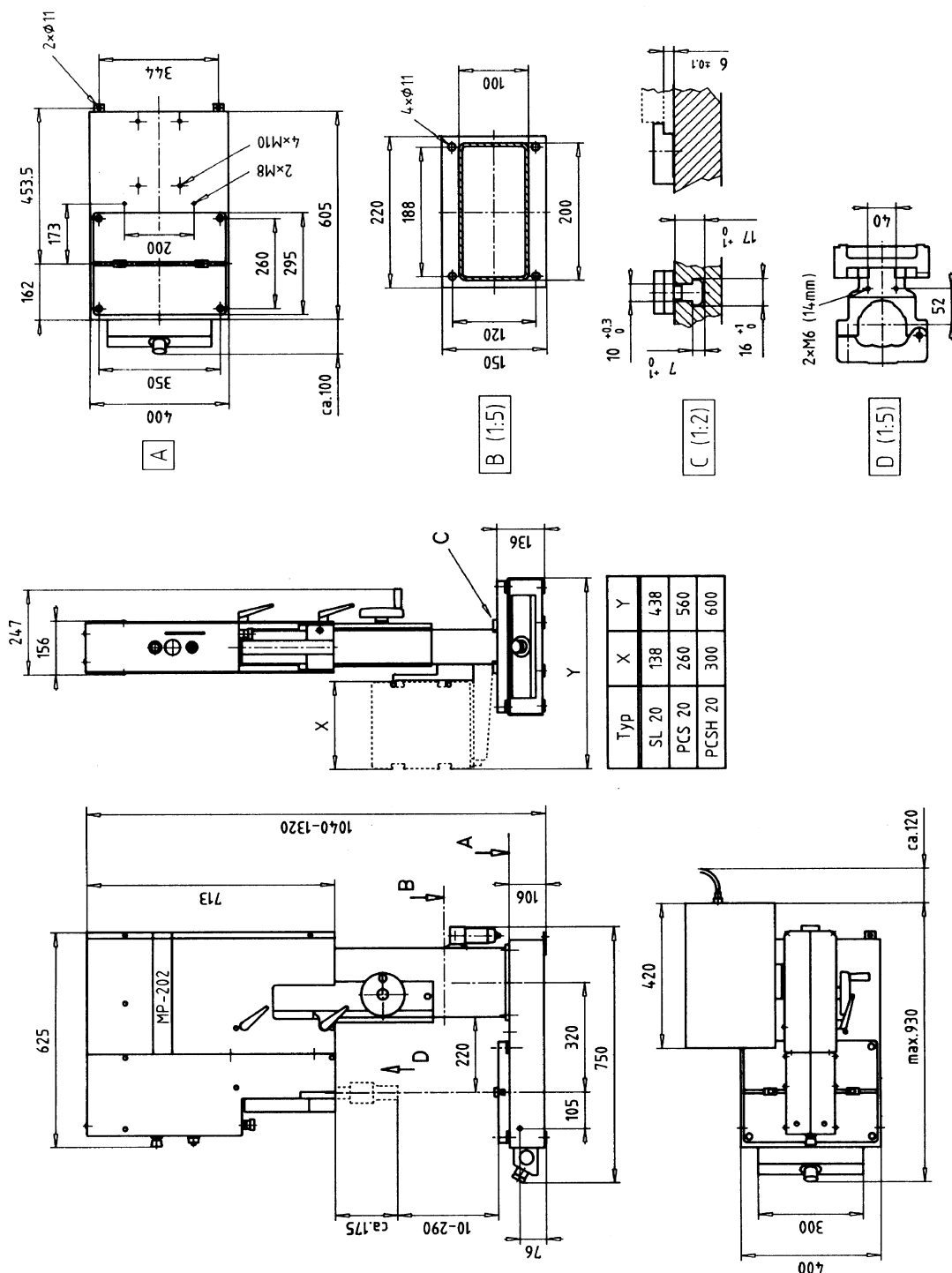




14 Technical drawings and values

14.1 Dimension drawing of the Multipress

1



14.2 Actuator PC-board

LED 1 Safety switch

LED 2 Pressure controller

LED 3 Home position

LED 1

LED on, if safety switch is activated.

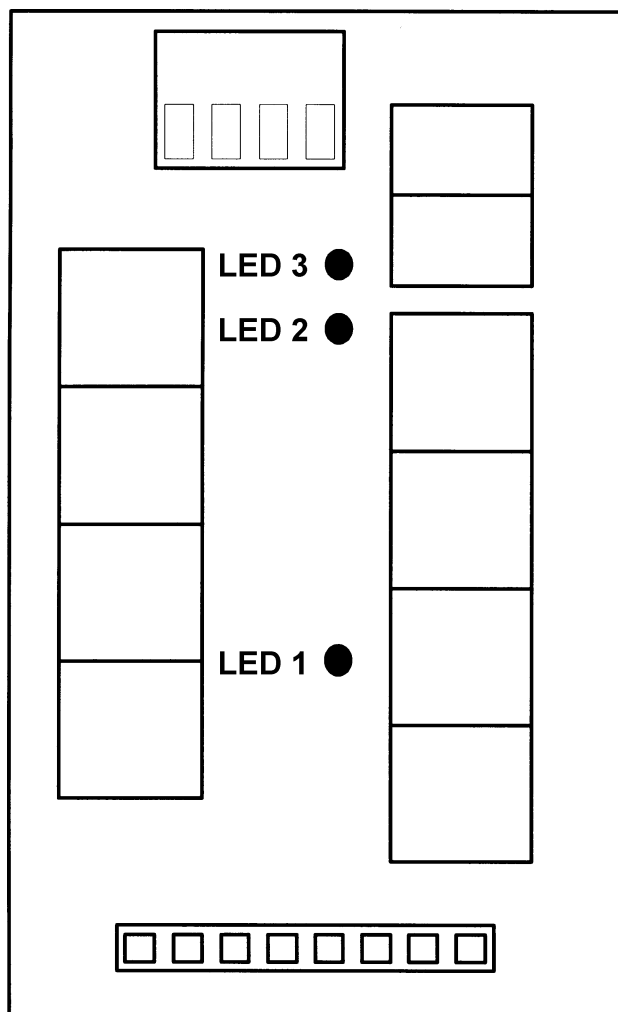
LED 2

LED on, if one or both solenoid valves activated.

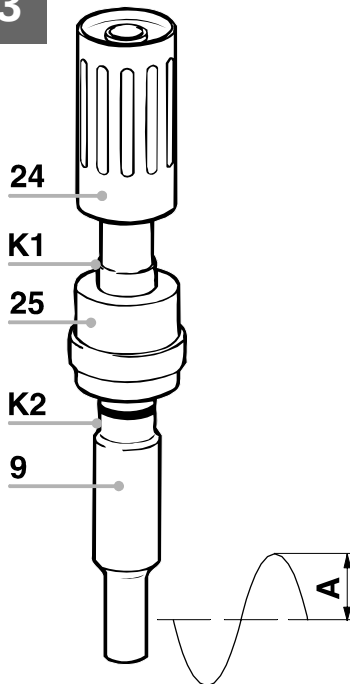
LED 3

LED on, if actuator in home position.

2



3



14.3 Amplitude values of the GM generator module series

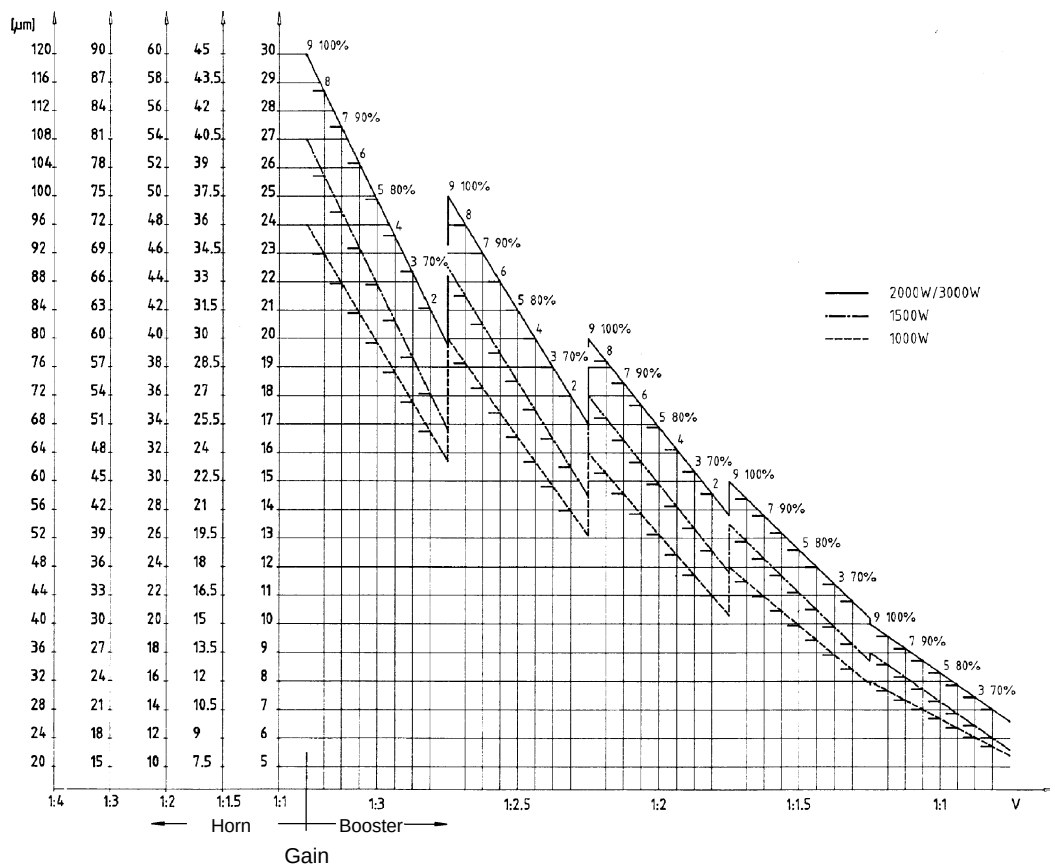
The different generator outputs result in different amplitudes. The amplitude value described in the following table refers to the respective generator/booster/horn configuration.

The effective welding amplitude can thus be read off directly.

- 9 Horn
- 24 Converter
- 25 Booster
- A Amplitude
- K1 Coupling point
- K2 Coupling point

14.4 Amplitudes of 20 kHz SL and PCSII generators

4



5 14.5 Stud length of the vibration components; 20 kHz

24 Converter



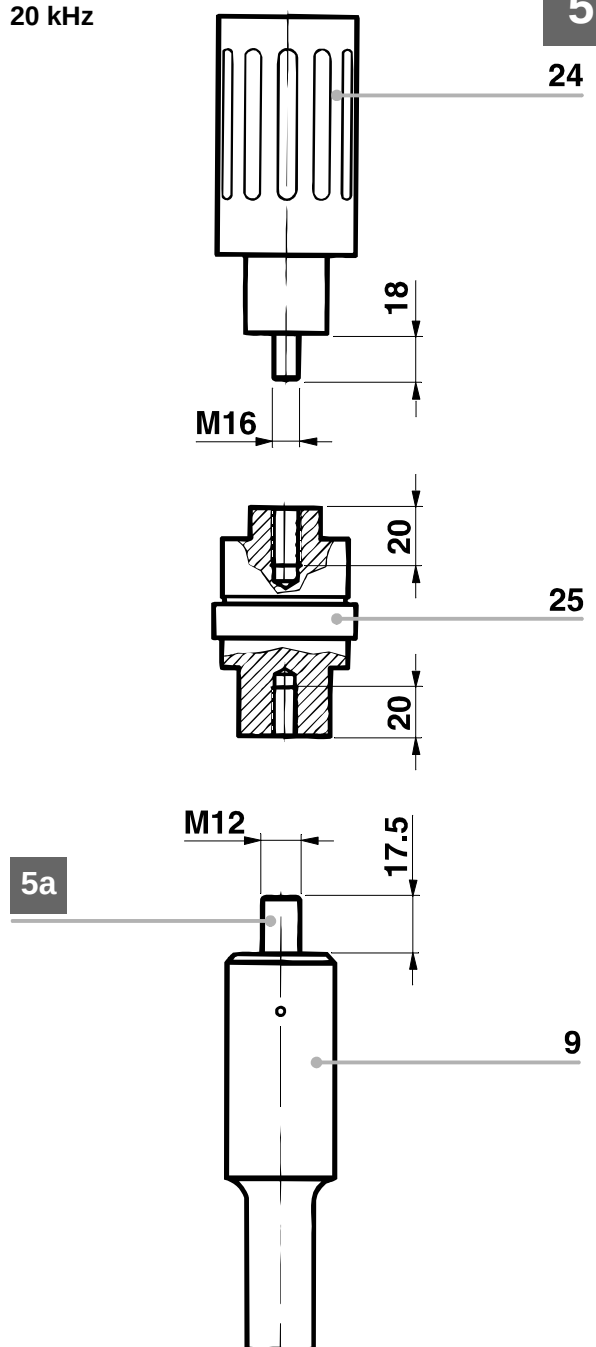
The converter stud is an integral component of the converter and cannot be detached!

25 Booster

The coupling faces are manufactured so as to be completely parallel and level.

9 Horn

20 kHz



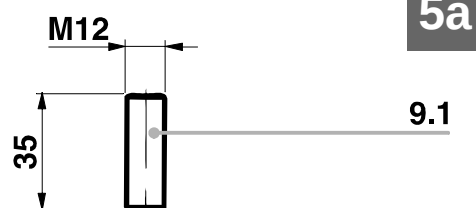
5a

9.1 Horn stud

Horn stud made of high-strength steel or titanium.

The horn stud is bonded in position in the factory.

Under certain circumstances, the stud may be detached.







15 Service center addresses

In the event of technical malfunctions or welding problems, the Techspan Group service centre will be glad to help.

To provide useful advice, our service center needs the following information:

1. The type designation and serial number of the unit.
2. An exact description of the technical malfunction or welding problem.

Our addresses:

✉ TECHSPAN GROUP
P O Box 1012, Mascot, NSW 1460
P O Box 15262, New Lynn, Auckland

Australia

☎ 1800 148 791
📠 1800 148 799

New Zealand

☎ ++64 9 827 6567
📠 ++64 9 827 6596

